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THE UNIVERSITY OF ALBERTA

MOTHER INFANT INTERACTION
A FUNCTIONAL ANALYSIS
OF COMMUNICATIVE BEHAVIOR

by

© TERESITA ADOLFO JOSE

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

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THE UNIVERSITY OF ALBERTA

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DATE . .June 11, 1980. . . .

To my Papa and Mama

who taught me the importance

of being human.

ABSTRACT

The purpose of this naturalistic and longitudinal study was to describe the nature and changes of mother-infant communication in the feeding situation. A secondary purpose was to determine the applicability of a functional analysis of behavior in early mother-infant interaction.

The theoretical framework of the study based on three assumptions are as follows: (a) Reflex action. A neonate is born with a limited behavioral repertoire which manifests in reflex like activities, such as sucking, tongue movements, swallowing, crying, and gross bodily activities. (b) Nonverbal matrix. In the process of interacting with the child, the mother essentially builds on the child's existing conditioned responses. As the infant continues to interact with his mother and other members of the family, a repertoire of behavior is established that serves to communicate on a nonverbal level. (4) Verbal matrix. Having learned a set of nonverbal behaviors in the form of sounds and gestures, a child, with the mothers help develops sounds that approximate the language of the community in which is is raised.

Five healthy Caucasian infants and their mothers served as subjects. Twenty-eight 15-minute videotaped observations of mother-infant interaction in the feeding situation were collected bi-monthly. Actual observations for each mother-infant pair were conducted over a period of three months from the time the infants were two weeks old, to the time when they were thirteen weeks old.

As predicted, the infants showed a narrower range of communicative behaviors than their mothers. Six out of ten categories for communicative behaviors were found in their nonverbal repertoire. They

are mand, positive affect, negative affect, submissive control and echoic categories. While the tact represented majority of the infants' interaction, a combination of tact, positive and negative behaviors characterized their interaction.

All categories for communicative behavior in both verbal and nonverbal forms were found in the mothers' interaction. While positive affective behaviors dominated the mothers' interaction, a varied profile which consisted of a high proportion of positive affect, mand, and tact behaviors characterized their interaction. This pattern was consistent throughout the six time periods observed.

The results reported here outline the basic pattern of early nonverbal communication of five mother-infant pairs and reinforced the importance of nonverbal communication, thought to be important in the acquisition of language. It also demonstrated the applicability of a functional analysis of behavior in early mother-infant interaction. The limited generalizability of the findings was recognized and an extension as well as replication of the study were recommended.

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CHAPTER I

INTRODUCTION

In order to understand the development of language in the individual child it is important to understand the nature of early mother and infant interaction. During the early stages of the infant's development interaction tends to centre around feeding, a situation which promotes social interchange for both the mother and infant. A description of the nature and function of early communication in the mother-infant dyad and how communication develops in the infant's first three months of life comprise the focus of the present study.

Although the study of language is complex, it is remarkable how quickly and easily it can be acquired by a child. The questions often asked about this speedy acquisition of language are, what factors are operative and how does a baby learn to manipulate most of his environment to have his needs met long before language is acquired in any sort of formal way?

It would seem natural that the care-giver, typically the mother, would be the most influential and powerful force in establishing the child's early learning experience. Schmidt (1973) has suggested that the child is very plastic and that the mother is the initial influential educator whose interaction with the child facilitates the process of humanization. The resulting end product is a being embedded in a microculture which is the family, who is gradually achieving a meaningful life for himself.

Recently there has been a marked interest in language development. The majority of research studies tend to be centered on the actual

mechanical aspects of speech production; consequently it is focused on children who have already acquired some speech or who have begun to babble.

Presyntactic stages of language development would appear to be the essence of any study examining the earliest communication aspect of a developing infant. The infant's use of nonverbal behaviors as an early mode of communication has received very little attention. In psychology this has been neglected and studies have concentrated almost exclusively on the details of the child's subsequent master of grammar. This approach, according to Ryan (1974),

> . . . can be characterised as exclusively cognitive, in the sense that it regards language as something to be studied as the object of the child's knowledge and ignores all the other skills that determine actual language use. (p. 185)

A look at the relevant literature indicates that there are a few researchers, Jaffe, Stern, Perry, and Craig (1973), who have explored some of the other skills to which Ryan referred. These researchers investigated infant adult gaze behavior. The resulting data, based on twenty-seven play periods, suggested that there might be properties which could predate the onset of speech. Ryan (1974), like Skinner (1957), also suggested that speech should be regarded as a form of behavior. In a study by Schaffer (1974), it was noted with some surprise that many mothers took turns with their babies in vocalizing. He described this as an example of interpersonal synchrony.

Research in semantics, the acquisition of meanings, is presently in vogue (Smith, 1978). Bruner (1975, 1978), taking his cue from sociolinguists, has been carrying out research on the acquisition of

social conventions or rules which govern two-way communication; these appear to be acquired prior to the child's formal linguistic system.

There have been few studies on preverbal communication of the very young infants involving eye contact, turn taking, and behavioral dialogues (Stern, Jaffe, Beebe & Bennett, 1975; Bateson, 1975; Bakeman & Brown, 1977). While Nelson (1977) surveyed preverbal communication and interaction of young children between 8 to 30 months old, early infancy appears to have been left out. A search of the relevant literature failed to reveal any longitudinal study concerned with the functional analysis of young infant's nonverbal mode of communicating with their mothers.

Purpose of the Study

The main purpose of the present study is to examine mother and infant communication in the normal home environment using a functional analysis of behavior as a technique for coding verbal and nonverbal behaviors. The study is longitudinal, descriptive, and designed to focus on the preverbal communication of infants in their first three months of life. It is also intended to observe and describe the communicative behaviors of five mothers as they interact with their infants in the feeding situation. The specific objectives of the study are as follows:

1. To describe the specific patterns and characteristics of mother-infant communication in the feeding situation. The description is intended to contribute to the present body of information and understanding regarding the nature and characteristics of early

pre-linguistic communication between mother and infant.

2. To determine through the application of a functional analysis of behavior the changes of mother-infant communication during the first three months of the child's life.

Approaches to the Study of Language

Historically it would seem that while interest and speculation in the purpose and the structure of communication dates back at least to the time of Herodotus in the fifth century B.C., the study of linguistics was left essentially to common sense, and was not studied scientifically until the 18th century (Bloomfield, 1933). Three of the many general theories on how language is acquired were briefly outlined by McLeish and Martin (1975) as follows: (a) language is God-given and therefore inborn, (b) language is a free and spontaneous creation of the mind belonging to man's nature, and (c) language has an evolutionary emphasis with reference to both the phylogenetic and ontogenetic development of speech as behavior.

Of the many interpretations of language acquisition the two most important interpretations of language acquisition have been Noam Chomsky's structural approach (1968), and Grace de Laguna's functional approach (1927). Structuralism, as expounded by Chomsky (1968), is based on the assumption that language is a reflection of higher mental processes with the implication that certain innate structures underlie the acquisition and the formulation of language. For Chomsky, language usage is a creative process. Sentences are not merely repetitions of what has previously been uttered, but often follow a

new pattern. Language is innovative, thus it would seem that Chomsky's theory emphasized creativity as the main criterion in understanding language acquisition in children. As an example, Chomsky's analysis of grammar sought to discover the relationship between what he designated as surface structures and the deep structures of the mind. Chomsky (1968) referred to this as the creative aspect.

> . . . the distinctively human ability to express new thoughts and to understand entirely new expressions of thought, within the framework of an 'instituted language,' a language that is a cultural product subject to laws and principles partially unique to it and partially reflections of general properties of mind. These laws and principles . . . . are not formulable in terms of even the most elaborate extension of the concepts proper to the analysis of behavior and interaction of physical bodies, and they are not realizable by even the most complex automation. (p. 6)

According to Chomsky, the child is born equipped with linguistic competence. This resides in what Chomsky called a language acquisition device. When a child is learning his first language, the language acquisition device enables him to process language input from other members of the community, therefore, without specific instruction or learning, the child is able to produce the output. Chomsky referred to this process as generative grammar. The task of the linguist is simply to identify the laws which govern the development and use of sentences or phrases.

Generative grammar has both surface structures and deep structures (Chomsky, 1968). He defined surface structures as the rules for the particular language that allow for syntactic and phonetic representation. On the other hand, the deep structures allow for an individual interpretation of a sentence. He defined the rules that

express the relation of deep and surface structures as grammatic transformations. Thus, while Chomsky conceived grammar as a relatively fixed system of principles, the grammar of a speaker represents the individual's specific and underlying linguistic competence. Actual performance, therefore, does not simply reflect the intrinsic sound/meaning connections which are established by a system of linguistic rules, but reflect the individual's creative use of the system.

On the other side, another approach to a functionalist theory of language is that of de Laguna, whose main concern was with the origin of speech and its development. The basis of de Laguna's theory is the evolutionary model which was rejected by Chomsky. In her book, Speech: Its function and development (1927), de Laguna treated language as a form of social behavior. Language has evolved and survives because of the function it serves in organizing group activities which serve the purposes of natural selection. She strongly disagreed with the premise that speech is a means of expressing ideas. For her, the change from arboreal to terrestrial dwelling brought with it a need for communication. Whereas, in an arboreal mode of life, the communicative function of a general cry was adequate for most situations, with the human terrestrial mode of life a more developed cooperative system appears necessary to change the environment. What was successful in the confines of tree life was rendered inadequate by the more variable and unpredictable elements of terrestrial life. This change of location, according to de Laguna, influenced the development of groups as a mechanism for survival and mastery of the physical environment. To facilitate this change, cooperative action was essential from the

human group members. The group's communication thus played a more important role in daily activities as the demand for order and survival increased. It was this type of communication, the association of speech with the development of cooperative labor, which was further elaborated by Engels (1940) and Vygotsky (1962).

With reference to animal cries, de Laguna identified cries according to their proclamatory aspects. These included (a) proclamation of presence or existence, (b) predictive proclamation, (c) proclamation that one is about to act in a certain way, and (d) proclamation that one has just acted in a certain way. But how does this fit into any developmental theory?

According to de Laguna, developmentally, the arboreal infant is born with the ability to cling to the mother or to trees if necessary. Amongst other things, the terrestrial baby, born ill equipped to cope with life by himself has necessarily to be more dependent upon adults. This dependent ground baby has to be taught to understand and to respond to cues for survival purposes, thus contributing directly to the development of communication which goes beyond the proclamatory aspects of crude speech. Further, the growing complexity of group life eventually encouraged the elaboration of more refined speech whose use in daily activities helped its preservation, and eventually its extension. Overcoming obstacles such as crossing a river while hunting, required better group organization and a greater specificity in communication than had previously been needed.

Continuing with her elaboration of the development of language, de Laguna suggested that particular specification became important as

groups became larger. Semantic precision in the use of words became particularly crucial in situations that required group action, and the felt need for specification, made for a more discriminating language. The controlling function of language is crucial. Group living created even more variable and complex situations which needed definitive descriptions. Hunting, which may have been a solitary activity, became a group concern, as was the search for food. To successfully achieve the goals of hunting, it became more and more important to communicate in a definitive manner.

One example of specificity quoted by de Laguna was that of the cry, which serves the dual purpose of giving information by proclamation and that of controlling behavior with a cry of command. In speech these two functions are necessarily separated. As speech develops, the cry of alarm becomes a true proclamation and ceases to be a command. The child of today is thus a product of selection in which survival value has been appreciably determined by adaptability to speech. To her, the child learns how to articulate sounds which are not true words for the child. A quality of trueness is achieved as the child attaches a specific meaning to words with objects and events. Speech at this point can be initiated in the absence of referent objects and events, and is viewed by de Laguna as having an independent function. Speech, as such, is seen as being context free. This is its ultimate function.

In a further elaboration of her theory, de Laguna suggested that there is only one way in which scientific study must be carried out in psychology, and that is by adopting behaviorism. She criticized what was at that time, the 1920's, the traditional school of psychology for

its use of introspection as a method of studying the mind. She also disagreed with Watson's behaviorism because of its apparent lack of concern for what happened to the organism in relation to its external surroundings. She also disagreed with Watson's postulation that behavior is a product made up entirely of glandular secretions and muscular movements and that behavior is ultimately reducible to physiochemical processes as Watson does. She contended that speech should be looked upon primarily as behavior which fulfills a social function. Studies on speech should follow a model which analyzes speech, not in isolation, but as a complete system which must include the social environment. For de Laguna, the important question was how speech served an organism, in its physical as well as its psychological environment.

She further advocated that, with a behavioral model which takes into account the social psychological environment, various species should be studied. A comparison of findings would then give a better picture of their similarities and differences. Such is considered to be of marked importance in the understanding of speech evolution. De Laguna appeared to have accepted the evolutionary framework of the functionalists and therefore postulated that, even though the transition of speech is a continuous process, two modes of communication may be distinguished in a growing child. These are the nonverbal mode and the verbal mode. Initially the child communicates in a nonverbal mode. What is communicated is felt rather than cognized. From the child's cry, the primitive mode of communication, the verbal mode that the child eventually learns consists of verbal utterances. The first

utterances are simple words, but these simple word utterances (holophrastic speech) are viewed by de Laguna as predictates, or comments on the situation in which the child finds himself. Gradually, from this mode of communication, sentences are created as a result of analyzed situations and are, therefore, nonprimitive. Speech usage to interpret actual situations in an organized and objective way, calls for a more precise use of words. De Laguna (1927) comments on the child's initial use of one specific word to function in different ways.

> It is precisely because the words of the child are so indefinite in meaning, that they can serve a variety of uses; and it is also - although this sounds paradoxical - for the same reason that they are fit to function as complete rudimentary sentences. A child's word does not, as we have seen, designate an object or a property or an act; rather it signifies loosely and vaguely the object together with its interesting properties and the acts with which it is commonly associated in the life of the child. The emphasis may be now on one, now on another, of these aspects, according to the exigencies of the occasion on which it is used. Just because the terms of the child's language are in themselves so indefinite, it is left to the particular setting and context to determine the specific meaning for each occasion. In order to understand what the baby is saying you must see what the baby is doing. The simple sentence-word is a complete proclamation or command or question, because the speech in which it occurs is so closely bound up with the attitude of response to his immediate surroundings. The independence of the primitive word with respect to other words is paid for by its dependence on the practical situation. (pp. 90-91)

Like Darwin (1873), De Laguna believed that communication in animals and in man is directly in tune with emotions. Such communication is direct and primitive and can omit the translation and interpretation of events which speech performs at a later stage. Even prior to this type of communication there is the nonverbal mode. The importance of the communication lies in the simple fact that the

communication intent is directly understood. For example, an animal baring its fangs indicates that it is preparing for the act of biting. This analogue can be extended to man. In the nonverbal mode, the act in itself serves to directly warn others of what is about to happen.

The Functional Approach to Language Study

The following serve as the rationale for the choice of a functional approach to language.

1. The main thrust of studies on language acquisition have generally centered on the structure, syntax, and semantics of language.

2. With infants learning the rudiments basic to communication, the functional approach seemed to be appropriate as a method of looking at specific behaviors in terms of their function.

3. Experimental analysis of behavior may provide the most appropriate method of determining what interventions might be maximally useful in stimulating language development (Lynch & Bricker, 1972).

It became evident in the review of literature conducted by the present writer that there is a dearth of studies on language acquisition using the functional approach. Although Skinner (1957) does not have a special theory of language, he does provide a theoretical frame of reference which is "inherently practical" in considering speech as a form of behavior (p. 12). Skinner's concept of verbal behavior corresponds well with de Laguna's (1927) formulation which strongly suggested that verbal behavior should be studied within the framework of behavioral method and interpreted as activities which perform a function. At the time she wrote, Malinowski (1923) had

provided such a model, but this was disregarded. Skinner's book, Verbal Behavior (1957), which appeared thirty years later, presented a viable functional model for analyzing verbal behavior. This model was not intended to provide empirical evidence of its applicability, but rather a topography of speech as a subdivision of human behavior. The system is partly derived from his animal experimentation and also partly from an empirical analysis of the function of language forms in literature and everyday life. It was not initially designed by Skinner for application in the naturalistic settings in which man finds himself. McLeish and Martin (1975), Oddie (1976), and McLeish (1978) have shown that its applicability is not confined to controlled laboratory settings, but represents the normal process of human communication very adequately.

According to Skinner (1957), verbal behavior represents any behavior reinforced through the mediation of other persons. Skinner preferred the term verbal behavior rather than the term communicative behavior. Verbal behavior, as used by Skinner, subsumes not only organized speech and written language, but includes audible, though not necessarily vocal behavior, such as hand clapping and gestures, under the same rubric. Using this formulation, calling a class' attention by saying, "May I have your attention please", serves the same purpose as switching the lights off to gain attention. The two examples are separate modes of achieving the same result.

The important feature of Skinner's analysis is his treatment of both speaker and listener in the context of social interaction. Skinner's functional analysis of behavior is mainly based on the notion

of reinforcement. This can be diagramatically simplified using the tri-member contingency model of the discriminative stimulus (S^d), response (R), and a reinforcing stimulus (S^r), arranged in the following manner. S^d ------- R ------- S^r.

Thus, a language is acquired by a continuous process of social learning. A child is born into a community of language where his verbal behavior is immediately shaped by members of the community. Initially this is done by the child's mother, then by other members of his family until such time as he learns to approximate the language of the particular group in which he is raised. In the initial stages of language acquisition, the mother plays an important role as mediator between the community of language and the child. A process of shaping or learning by approximation can be seen as the child learns to speak a particular language. The child's achievement is not only reinforced by the approval of the parent and the community, but speech itself acts as a reinforcing agent.

Skinner classified verbal and nonverbal communicative behaviors into six types. These six operants he labeled Mand, Tact, Extended Tact, Echoic, Intraverbal, and Autoclitic. Skinner's classification of verbal and nonverbal operants is seen as a comprehensive taxonomy of possible verbal and nonverbal behaviors, where each class of operant is defined by certain selected properties. This classification offers the total range of behaviors an individual is capable of producing. If applied to any one individual, this range of behaviors is seen as his repertoire of verbal behavior. This concept of a verbal repertoire is similar to the concept of a vocabulary in a given

language. However, while vocabulary is seen by Skinner as more or less a warehouse of tools, a verbal repertoire has a controlling aspect to it that gives it its dynamic character.

Theoretical Framework and Rationale for the Present Study

De Laguna (1927) suggested that the study of language is best approached by using a functional analysis of behavior. In accepting her line of thought, the Skinnerian contingencies of reinforcement paradigm appears to be an appropriate model to use in this study, along with his categories for analyzing verbal behavior. The three-fold contingency reinforcement model defines a discriminated stimulus (S^d) and a response (R), where the stimulus strength is maintained or increased when the response is followed by reinforcement. The model has been used in studying verbal interaction among adults (Martin, 1973; Oddie, 1976). A pilot study conducted by the writer found this model both practical and appropriate for the study of mother-infant interaction as well (Appendix A).

In accordance with the theoretical formulations relative to the acquisition of verbal behavior, the working model and rationale for the present study may be summarized as follows:

Neonate. A neonate is born with a limited behavioral repertoire which is manifested in reflex-like activities such as sucking, tongue movements, swallowing, crying, and gross bodily activity (Flavell, 1963).

Piaget's developmental theory is compatible with this assumption of a neonate in that his schema connotes a cognitive structure,

sequences of behavior, and organization implying a plan of action or strategy. This arrangement subsumes reflex-like activities that characterize the first stage of the sensorimotor period. Supporting this assumption is Baldwin (1967) who claimed that reflexes are actually schemas and that the only difference between reflexes and schemas is that reflexes are innate (p. 204).

Piaget's six subdivisions of the sensorimotor period (Flavell, 1963) described the transition from the first stage (0-1 month) where reflexes predominate, and the third stage (4-8 months) when intentionality becomes evident. In learning paradigm terms, the emergence of intentionality suggests an increase in the instances subject to behavioral conditioning, however, some studies have reported instrumental conditioning at early ages (e.g., Sigueland & Lipsitt, 1966). While studies of classical conditioning are rare, Horton and Turnage (1976) suggested that

> . . . elements of classical conditioning also seem to be involved in the behavior of infants. For instance, in the parent, especially the mother, may come to serve as CS paired with the occurrence of very pleasant US's such as feedings, cuddlings, and diaper changes. (p. 61)

According to Logan (1976), classical conditioning occurs when a conditional stimulus (CS) precedes an unconditioned stimulus (UCS), the latter eliciting a response that becomes conditioned to the former. Operant conditioning involves the reinforcement of a freely occurring behavior. The reinforcement increases the probability that the behavior will occur again (Horton & Turnage, 1976).

Mother-Child. In the process of interacting with the child, the mother may essentially build on existing unconditioned responses. As

an illustration, the mother's voice (before it becomes known to the child) may elicit nonverbal behavior in the child. If the mother shouts, "Hey, baby", the child will initially respond to the stimulus as a sound rather than a discriminated stimulus. The child may respond to sounds using the orienting reflex, which may take the form of looking in the direction of the sound. As the child attends to the mother, she may reinforce the behavior by smiling. With repetition of this sequence the operant becomes established and the behavior is learned.

Nonverbal Matrix. As the child continues to interact with mother and others, a repertoire of behaviors is established which serves as the basis for communication on a nonverbal level. Behaviors which originate as reflex actions develop into a communication system through selective reinforcement. For instance, if the child receives attention for crying, he will learn that this behavior may be used to obtain mother's attention. Both mother and child develop a two-way communication using different nonverbal behaviors.

Verbal Matrix. Having learned a set of nonverbal operants in the form of sounds and gestures the child, with the mother's help, builds on them to develop sounds that eventually approximate the language of the community in which he is raised. Initially the child imitates without necessarily understanding word meanings, however, he eventually uses words without reference to physical context and learns symbolic language. In summary, from the reflex activity, the child further develops a nonverbal matrix mode from which language is built.

Definition of Terms

Naturalistic. The term naturalistic pertains to a method of study which attempts to record all observable behaviors of mothers and infants as they naturally occur in the feeding situation through the use of the videotape. This type of observation was initially used by ethologists in the study of lower forms of animals.

Descriptive. In this study descriptive refers to the patterns and impressions derived from the interaction of the mother and child dyads during feeding.

Quantitative. To facilitate description of observed behaviors during interaction behaviors were coded into ten types and a frequency count done on each. This was conducted to simplify the identification of behavioral patterns and its changes in both mothers and infants over a period of twelve weeks.

Hypotheses and Research Questions for the Present Study

To describe the patterns and characteristics of mother-infant communication in the feeding situation and how the patterns change over a period of three months, the following hypotheses and questions are formulated.

Infants

1. Infants in the neonatal stage will be exhibiting language related behaviors. Communication will be mostly nonverbal. Which type of communicative behaviors will appear in the infant's interaction?

2. The range of the infant's behaviors will be narrower at the earlier stage. Later the range of the infant's behaviors will widen

over time. Which types of communicative behaviors will appear in the infant's interaction following the first observation over a period of three months?

Mothers

3. Mothers will show a wider range of communicative behaviors than their infants on account of their maturity. Which types of communicative behaviors will appear in the mother's interaction?

4. A large part of the mother's time will be spent in affectional behaviors with the child. Positive affect will be high since feeding is hypothesized as a warm and positive situation for the child. Which types of communicative behaviors will appear in the mother's interaction over three months?

Advantages of a Naturalistic Observation

In the area of preverbal communication where limited behavioral information is available, Bateson (1975), Nelson (1977), and Ryan (1974) have suggested the importance of naturalistic observations in providing the full range, richness, and complexity of behaviors.

Mahoney (1975), Meddinus (1976), and Lytton (1980) support the necessity for studying actual behaviors, since behaviors observed as they naturally occur provide a basis for both ecological and face validity. Identification of actual behaviors opens up the possibility for analyzing different situations. Assessment of these behaviors as they naturally occur provides the groundwork for further analysis. Use of observed behavioral characteristics is important when applying correlational analysis since test scores, which are often used, are

also assumed to be a child's enduring characteristics (Lytton, 1980).

A naturalistic observational analysis also allows the observer to examine the controlling stimulus and rewards for both the infant and parents behaviors.

Methodological Problems of a Small N

The case study approach has been used throughout the history of psychology. In Dukes' (1970) detailed historical account, he noted 246 such studies published over a period of 25 years between 1939 and 1963. He also cited Ebbinghaus' work on memory (1913), Freud's (Strachey, 1955) case analysis of Anna O., and Prince's (1905) study of Miss Beauchamp's multiple personality.

Most animal experiments relating to language acquisition have also reported use of an N of 1, as shown in Kellogg's (1933) study of his own child, Donald, and the chimpanzee, Gua. More recently, Premack and Premack (1972) reported teaching a chimpanzee named Sarah a total reading and writing vocabulary of 130 words. In the human developmental area, Piaget's influential work is based on the case study approach using a small N.

The idographic method, however, is more prevalent in the actual application of theoretical psychology. This may be seen in the counseling or clinical setting. Experiments in behavior modification as outlined by Willis and Gilles (1976) suggested the importance of viewing the individual in relation to his environment while applying the known behavioral laws.

While a small N reduces the degree to which generalizations can be made, the ultimate sample choice is determined by the purpose of the

investigation as well as the considered time and cost limitations of the project. The generally accepted place for a small N is not only when uniqueness of the sample is considered to be of prime importance, but also in problem centered research where it is necessary to clarify questions, define variables, and delineate approaches in the study of behavior (Dukes, 1970).

The Research Design

The interaction of five mother-infant pairs in the feeding situation was observed six times over a period of three months. Observations lasting 15-20 minutes each were videotaped by the researcher in the homes of the mother-infant dyads. The first observation began two weeks after the infant's birth, and subsequent observations were conducted every two weeks. The duration and frequency of observations made were determined by practical reasons. Mothers in the pilot study indicated the efficacy and unobtrusiveness of bi-monthly observations.

The expensive and time consuming nature of the study determined the present sample of five dyads, which naturally limits the generalizability of the present findings. Furthermore, the families who participated were of educated middle class backgrounds, and were highly verbal in their interaction. Results can therefore only be interpreted within this particular group.

The home setting was used in this study for the parents convenience and comfort. Mothers in the study expressed a strong preference for being videotaped in their own homes rather than in a laboratory situation. They also felt that at two weeks their infants

were too young to travel and be transported outside the home, unless for medical reasons.

Despite the time consuming nature of a longitudinal study, this method was chosen over a cross sectional approach since the primary purpose of the study was to examine the taxonomy of mother-infant communication during the infant's first months of life. As Kessen (1960) pointed out, developmental psychologists have expressed preference for the longitudinal approach because it generally tends to simplify what is complex in child development. For instance, in the study of variation (both behavior and state), longitudinal studies simplify problems of reducing variation other than age. A study of personality changes in fast maturing and slow maturing boys illustrate this. Longitudinal studies also tend to be sensitive to small changes in the behavior of subjects over age. Furthermore, homogeneity is increased by the use of repeated measurement on the same children. As a method, a longitudinal study offers reusability of the information gathered and helps present an integrated and sensible picture of the developing child.

While the study is descriptive, naturalistic and longitudinal controls were attempted whenever feasible. The feeding situation was chosen for observation due to the neonates' apparent wakefulness at this time, as opposed to their predisposition to sleep at other times during the first few weeks of life. Biographical studies of infants support this decision (e.g., Church, 1966). The 1976 pilot study conducted by the writer using the feeding situation as a basis for observations was strongly supported by all five mothers involved in the

study. Details of the preliminary study is in Appendix A.

It must also be pointed out that this study is exploratory in nature, and that the coding system used was developed and applied only with adult groups (McLeish, Martin (1975) and Oddie (1976). For infants and mothers in this study, some modification of the coding system was necessary.

CHAPTER II

REVIEW OF RELATED LITERATURE

The steady increase in infant research over the past ten years suggests that a comprehensive review of literature can only be embarked upon as a full-time job. For the purpose of this study, a selected review of literature pertaining to the following will be conducted: (a) higher primate studies relating to language teaching, (b) behavior modification studies on language teaching, and (c) parent-infant interaction studies.

Higher Primate Studies Relating to Language

While the ability to speak in one or more language serves to distinguish man from primates, psychologists have, through their research efforts, demonstrated an interest in defining the limits as well as the extent to which language teaching in the chimpanzee can be carried out.

Kellogg and Kellogg (1933) determined to investigate how a chimpanzee's development would compare to that of a human infant, accordingly designed a nine month experiment involving their 7½-month-old male child (Donald), and a 2½-year-old chimpanzee (Gua) who was born in a cage and taken away from her mother to live with the Kellogg's for the duration of the study. While both subjects were reportedly treated in a similar human way, differences were noted in their development. In the area of communication and language these differences were marked. While vocal communication at an early age was observed in Donald, Gua's general method of communication was not equally developed and was described as a language of action.

In this study it was observed that inflection and intonation without articulation characterized the human child's communication with high pitched rising intonation related to pleasant experiences, and downward pitch intonation with unpleasant experiences. When Donald was 17 months old the experimenters interpreted the differences in intonation to be equivalent to the words yes and no. It was also observed that the combination of two different pitches were accompanied by crude pointing, which involved an extended arm with fingers spread out in fan shape and wrist bent backwards (Kellogg & Kellogg, 1933).

On the other hand, Gua's communication consisted mainly of a language of action which required a level of intimacy for these actions to effectively communicate needs. An example of such action consisted of protruding lips combined with a body lean towards a cup, in some instances, suggested the need for more milk.

The significant difference in the two subjects were clearly summarized by the researchers in the following statement: "The superiority of the child in vocal imitation stands also as a striking difference between the two subjects" (Kellogg & Kellogg, 1933, p. 272). Donald was also superior in articulating sounds and usually vocalized without provocation, which Gua did not do. While Gua developed vocalization towards the latter part of the study, his repertoire of sounds was limited to the following: (a) Bark, a guttural grunt which signified aggression, threat, or attack; (b) the Food Bark which was related to the first bark, but was usually softer; (c) the Screech or Scream, characterized by a shrill cry usually emitted when in fear or pain; and (d) the OO-OO cry which resembled the sound of a whining

dog and served to communicate trouble, alarm, uncertainty, or fear.

Taking into account the lack of vocal imitation in the chimpanzee as suggested by Kellogg and Kellogg's study (1933, 1968), Gardner and Gardner (1969) developed a training procedure for a wild-born female, 8-14 year old chimpanzee based on the American Sign Language (ASL), which is also currently used by the deaf in North America. The two-way communication, based on gestures, was also the language used in the training laboratory by all four researchers in the project during the entire 22 month period of the study. All ASL signs taught may be classified into touch and non-touch signs. While touch signs involve touching where one hand contacts another or a part of the signer's body, non-touch signs do not involve tactile feedback. Procedures used involved (a) imitation, where Washoe had to acquire the sign by watching the experimenter, (b) molding, where the experimenter molded Washoe's hand into the appropriate signs, and (c) freestyle, in which the experimenter combined both imitative molding and other forms of guidance (Fouts, 1972). The fading procedure used in molding the freestyle methods of training is similar to that used by Lovaas et al. (1966). An example of this procedure would be the training of the "B" sound. The prompt, which involved the adult holding the child's lips is gradually faded by moving the experimenters fingers to the child's cheeks, then to the jaw, until no prompt is required to elicit the "B" sound.

After exposure to a wide variety of activities and objects, together with their appropriate signs using the above procedures, the experimenters reported that of the 30 signs Washoe acquired, 24 were

taught using the molding procedure. Criterion used for acquisition was the spontaneous and appropriate use of a sign daily for 15 consecutive days. Manual babbing, which involved touching parts of the head and body and waving, was encouraged by the researchers responsiveness in the form of clapping, smiling, and repetition of the gestures as one might repeat "goo goo" to a human infant (Gardner & Gardner, 1969, p. 667).

Concerned with the natural features of human language, Premack and Premack (1972), and Premack (1971), reported teaching Sarah, a female chimpanzee, a reading and writing vocabulary of 130 terms which she used with a reliability of 75% to 80%. In this experiment, variously shaped and colored pieces of plastic were used, each representing a word or a code. The initial step taken by these investigators in teaching a simple language code was a mapping out of the social exchange present in the chimpanzee. Giving was singled out as a usual characteristic of the chimpanzee, and was therefore used in setting up a naming repertoire of both objects and persons involved in the study. The procedure used may be illustrated by the simple example of teaching Sarah the plastic symbol for banana. Having established that Sarah accepted bananas from the experimenter and proceeded to eat them, the next task involved the introduction of the plastic symbol of banana which was a triangle. Sarah was encouraged to place the plastic chip on the magnetic board before the next banana was dispensed. Through a similar procedure the symbols for other fruits were learned.

The concepts of <u>same</u> and <u>different</u> were used to teach the interrogative form. Other concepts involved a distinction between

name of and not name of. Class concepts of color, shape, and size were also used. The basic training paradigm consisted of the presentation of two positive instances and two negative instances, followed by a transfer set. Transfer set involved the same problem using new items or objects which were not used in the initial training of the concept. As an illustration of the teaching of the interrogative form, the following steps were taken. Sarah was first exposed to various sets of objects (e.g., two cups, two spoons, etc.) and later two of the three objects presented were matched. A pair of objects (e.g., two cups) were then presented along with the plastic chip with the symbol same. Similarly, dissimilar objects (e.g., a cup and a spoon) were presented, but instead of one chip, two chips were given to Sarah. This required making a choice as to which of the chips matched a given presentation. Eventually the question mark symbol was introduced in between the two objects to allow the experimenter to ask the question as to whether the two objects were the same or different. By mere substitution of the question mark with either one of the plastic chips Sarah indicated her answer. Transfer was effected when the same operation was performed using objects that were not employed during the initial training of the specified concept. In this case any deviation from spoon and cup would be considered novel.

Rumbaugh and Gill (1973) investigated the difficult problem of recording the chimpanzee's attempts at sequencing words to form rudimentary syntax. To accomplish this, experimenters used a computerized language training equipment which consisted of a visual display of communication, devices for dispensing various incentives,

including food, liquids, music, movies, toys, and a device that opened a window for viewing the outdoors, to teach a 2½-year-old chimpanzee how to discriminate between sentences that were valid from those that were invalid. Words used were in Yerkes, a modified form of English. Each Yerkish word consisted of a distinctive geometric white symbol on a colored background, and each symbol was derived from nine stimulus elements—singly or in combination—on three color backgrounds—singly or in combination. Two hundred and fifty-five distinct symbols based on words of the Yerkes vocabulary were used.

Four types of experiments were conducted. In the first experiment the researchers introduced one valid sentence beginning, 'please machine give', to which Lana could add symbols for juice, m and m, or piece of banana. The invalid sentence beginning involved the substitution of words like juice, m and m, music, Tim, for either machine or give. All trials with valid sentence beginnings were successfully completed. Trials involving the introduction of invalid sentence beginnings were not always successfully completed. On the invalid trials, Lana obtained an average success rate of 92%.

The second experiment was identical to the first except that the word make was substituted for the word give. Options involved window, open, music, and movie. Please machine make movie, please machine make music, please machine make window open. The introduction of valid sentence beginnings were successfully completed in 80% of the trials. Trials involving the introduction of invalid sentence beginnings obtained an average success rate of 91%.

In the third experiment, only valid sentence beginnings were used.

This included: please, please machine, please machine give, please machine make window, please Tim, please Tim come, and please Tim come into. When one word was presented, Lana was 80% correct; two words, 70% correct; three words, 74% correct, and four woods, 100% correct.

The fourth experiment was similar to the third experiment except that other options were provided. These options were: apple (to follow piece of), juice, water, music, tickle, and Lana. Accuracy scores reported with sentence starts, from one to five words, were 100, 65, 93, 100, and 95 percent respectively.

Results of the four experiments were taken as a sign that Lana accurately perceived Yerkes words, read their serial order, and descriminated whether they can or cannot be completed in order to obtain the various incentives.

To summarize, the experimental methods may be described as trial and error procedures where Lana obtained rewards for successful sequencing of symbols into an acceptable syntax, as programmed in the computer. While unsuccessful attempts were not rewarded, the computer was programmed to erase invalid sentence beginning, such as banana, movie, instead of machine give, by depression of a period button which gave Lana a chance to try another sentence arrangement. The initial training involved single words that assured Lana a reward upon pressing the right button. Level of difficulty was raised gradually with the addition of new words such as please, and a period after a sentence.

From the above review of the literature on the methods of teaching language to higher primates, one obvious limitation that was repeatedly demonstrated was the chimpanzee's lack of vocalization. The necessity

of establishing either an elaborate gestural system, or an awkward symbolic repertoire to further discover the limits of the chimpanzee's ability to acquire human language forms were clearly demonstrated in these studies.

Two research methods appear to categorize primate studies on language teaching: a naturalistic approach, and a laboratory approach. While both methods have merit, the crucial research question that remains unanswered in primate research is whether a human experimenter, despite his intensive efforts at teaching an ape language, really regards and therefore behaves towards a young ape like he would towards a human infant. An observation of human mothers and their infants alone would suggest to the naive observer the constant care, intense involvement, and extensive as well as continual communication in various forms required in the teaching of language. While teaching is usually done by the mother, she seldom has a conscious intent to teach language. She nevertheless is continually acting and responding in ways that enable the child to learn something new.

Applied Behavioral Analysis and the Acquisition of Language

Research studies focusing on the behavioral aspects of language appear to center around child and adults who failed to develop speech during the expected onset of language, and are therefore handicapped on account of verbal skills expected in a verbal community. Siegal (1969) noted that few speech learning experiments on infants have been conducted, although "it has become virtually a truism to assert that speech is a learned behavior" (p. 6). Garcia and De Haven's (1974)

review and analysis of the use of operant techniques in the establishment and generalization of language found very little research available.

In the area of infant vocalization, Rheingold, Gerwirtz, and Ross (1959) reported successfully conditioning 21 infants to increase their vocalizing output in six days.

Nine sets of observations a day were conducted. A block of three observations were done during the first part of the morning, the second block of three late in the morning, and the third block of three after the midday meal.

In the first two days (baseline days) the experimenter presented himself to the child and looked at him with an expressionless face for 15 seconds. During the third and fourth days (conditioning days) the experimenter approached the child in his crib with an expressionless face, except that whenever the child smiled the experimenter responded immediately and delivered the reinforcement, which consisted of a broad smile, the "tsk" sounds, and a light touch applied to the child's abdomen. On the fifth and sixth days extinction was established. Conditioning raised vocalization levels and extinction lowered it to baseline levels in this study.

A similar study was conducted by Weisberg (1973) using 32 infants as subjects and employing modified reinforcements. He reported a similar increase in vocalization. Along the same lines, Hurch and Sherman (1973), employing parents as the source of reinforcement, demonstrated empirically the successful use of modelling and praise in increasing the vocalization of three infants between 15 and 24 months

of age studied in their natural home setting.

Imitation, as an approach to speech acquisition, has been frequently employed in studies involving nonspeaking children. Lovaas et al. (1966) reported acquisition of imitative speech in two mute schizophrenic children. Verbal imitation was established through discrimination training procedures. The children were rewarded if they emitted a sound. They were rewarded only if sound approximated the adult's sound. Toward the end of the training, reward was given only when vocalization closely matched the adult's vocalization (i.e., if it was in fact imitative).

The first part of this study devoted itself to eliciting any form of vocalization, as well as visually fixating on the experimenter's mouth. In the second step, reward became contingent upon the emission of sound within six seconds. The third step was similar to the second step except that the child was required to actually match the adult's vocalization before receiving the reward. This was repeated and more difficult words were added. New sound which were very different from those in step three were added in step four. This was introduced so that the child would learn to discriminate between the new and old sounds more easily.

After 26 days of training, both children learned to imitate new words with ease and rapidity. Both children were then introduced to the second phase of the language training programme. This was conducted in a complex environment with many events happening concurrently. It was then hypothesized that the reward given for imitative behavior was crucial to learning. To test this hypothesis

rewards were made contingent upon time, regardless of the child's behavior. As expected, a deterioration in imitative behavior was observed. The researchers concluded that reward immediately following correct imitative behavior and withholding of reward following incorrect responding is an important variable in maintaining imitative behavior in these children.

Hewett (1965) reported successfully conditioning a five year old autistic child with behavior and management problems using reinforcement techniques. Four parts of conditioning involved the introduction of child to therapist and booth, motor imitation, imitation of undiscriminated vocalization, and eventually discriminated vocalization. The last segment of the study devoted itself to the teaching of "meaning" using similar techniques. In a similar type of study, Clarke (1974) demonstrated that children need to be taught word meanings.

In another study involving simple and compound sentences of an eight year old autistic boy, Stevens-Long and Rasmussen (1974) succeeded in demonstrating the efficacy of reinforcements in teaching children the use of simple and compound sentences. Lutzker and Sherman (1974) used imitation and reinforcement procedures in teaching both a normal child and a retarded adult male the generation of descriptive sentences. Garcia, Baer, and Firestone (1971) reported teaching four nonimitative severely retarded children vocal responses following training in the imitation of small and large motor activities. They reported generalization of the imitation taught.

Using picture cards, Garcia (1974) trained two profoundly retarded

subjects in the use of the following sentences: (a) "What is that?"; (b) "It is a (label)," in response to the question, "What is this?" or "What do you see?"; and (c) "Yes, I do," in reply to the question, "Do you want the (label)?" Generalized use of these sentences in settings other than the training situation was observed. A similar study reinforcing the use of social greetings was conducted by Kale et al. (1968) on three withdrawn schizophrenic patients. Without the application of experimental procedures, social greetings were observed to be used by the patients three months later.

Studies on receptive language have also been conducted using behavioral techniques. Guess and Baer (1973) taught retarded subjects general pluralization rules in both receptive and productive modalities, but generalization of learning was limited for only a specific class of plurals ending in s. Similar results were found by Guess (1969). In a similar way, studies on productive speech such as the studies of Garcia, Guess, and Byrnes (1973); Guess, Sailor, Butterford, and Baer (1968); and Baer and Guess (1971); have received some attention. Wheeler and Sulzer (1970) demonstrated the successful use of operant training in modifying a speech deficient child's telegraphic speech. Again, generalization of learning was observed.

Reinstatement of speech which may have some parallel to the acquisition of speech has been studied among non-speaking adults. Isaacs et al. (1960) succeeded in reinstating speech in two long standing hospitalized mute schizophrenics using a simple reinforcement technique. Sherman (1963, 1965) demonstrated the viability of reinforcement and shaping procedures in eliciting normal speech

behavior in four long term hospitalized schizophrenics.

A cogent exploratory study on the ontogenesis of speech acts in infants was described by Bruner (1975). Concerned with the existence of language universals, he set up a homelike situation in his laboratory and arranged for the mother of a child to demonstrate three situations: (a) feeding, (b) bath time, and (c) play. Bruner concentrated on looking at correspondences in the nature of actions and structure related to speech. Essentially his observation centered on (a) how the infant was involved in the learning of segments of joint action with mother, (b) how elaborate constructions were set up for assessing joint references, (c) how the mother systematically acted upon or commented on what was believed to be their mother and child joint attention, and (d) how a child learned phonological patterns. Bruner, however, gave no report of his findings, but suggested that in an ongoing research project he was conducting tighter controls on the kind of mother-child enterprises observed were incorporated. This specific exploratory study produced material they were not particularly interested in looking at.

Parent-Infant Interaction Studies

Lewis and Lee-Painter (1974) stressed the importance of looking at varied interaction in the study of human behavior to avoid distortion. Using 55 12-week-old infants (27 males and 28 females), they conducted an ethological study of mother-infant behaviors. Two observers recorded the interaction live for all subjects in the study. The two hour observations focused on various unstructured routine activities

in which the mother and infant usually engaged. Frequency counts on the infants' vocalization, extra movement (all gross physical movements), fret/cry, feeding, quiet play, and noise accompanied with vocal sounds were tabulated. The same procedure was applied to mothers. They observed touching, holding, vocalizing, looking, feeding, rocking, reading, watching TV, and vocalizing to others by these mothers. While these behaviors define the activities in which the mothers and infants in the sample were engaged, the range of variability in frequency counts (e.g., smiling or vocalizing) did not provide an understanding of the dynamics of a dyadic relationship.

Lewis and Lee-Painter (1974) concluded that "this type of analysis taps only one aspect of the relationship and does not allow us to really understand the dynamics of the interaction between the participants" (p. 34). While the purpose of the study was to arrive at an understanding of a measurement of interaction, both researchers agreed that "the analysis of elements rather than the interaction itself was a mistake" (p. 46). Elements, they concluded, never exist outside the interaction.

In a 15 month longitudinal study involving a set of male fraternal twins and their premiparous mothers, Stern (1971) demonstrated the efficacy of the frame-by-frame videotape analysis of mother-infant interaction. Videotape observations in the homes of the subjects were taken for three consecutive mornings when the infants were three months old. Home visits were made initially twice a week for three weeks, then every other month until the infant's ninth month. Subsequent visits were made every three months through the fifteenth month.

Behaviors examined in the interaction included: (a) face directions and head turns, (b) rotational and non-rotational movements of mothers' heads; toward or away from the child's face, (c) movement neither towards nor away from the infant, and (d) motions of mothers' upper extremeties with notation of direction toward and away, or other, relative to the infant's face. Scoring, however, required a determination amongst the two scorers whether movements were toward or away from the other member.

Results of that study showed that Mark, the first born twin maintained a longer period of face-to-face contact with mother, but also kept his face turned away from her for longer periods of time. The younger twin, Fred, neither kept face-to-face contact with mother for long, nor did he stay away from face-to-face contact for any length of time. Compared to Fred, Mark consistently maintained longer periods of face-to-face interaction with mother at 2, 6, 9, and 14 months. He reacted in a similar fashion to strangers and his father at 6, 9, and 14 months. A follow-up study on these two children described Fred as fearful and dependent, usually refusing prolonged eye-to-eye contact. Mark, on the other hand, continued to prolong eye-to-eye contact and greeted people well. While no reasons for these differences in interaction were offered, Stern (1971) suggested that later patterns of interpersonal behaviors can be possibly determined as early as 3½ months of age and are consistent with visual motor behaviors.

Stern, Jaffe, Beebe, and Bennett (1975) reported a study of eight normal 3-4 month old infants of four twin sets. Two monozygous and two dyzygous sets; five girls and three boys. Mothers were primiparous,

from a middle socioeconomic class. Weekly morning visits were conducted for one month and videotaped observations of the interaction during free play situations were obtained. Each of the four trained observers simultaneously coded the following behavioral categories: (a) baby's gaze on or off mother's face, (b) mother's gaze on or off baby's face, (c) mother's vocalizing, and (d) infant's vocalizing. Interrater agreement ranged between .86 and .96. While 16 combinations of the four variables were assigned a dyadic state, the writers reported only four of the variables: (a) maternal vocalizing, (b) infant vocalizing, (c) both silent, and (d) both mother and infant vocalizing. The study demonstrated that while all dyads were capable of both coaction and alternating patterns of interaction, coaction occurred twice as frequently as the alternating pattern. Arousal level appeared to increase coaction as in instances where positive or negative emotions were experienced. Mothers with arousing interaction with their babies elicited more of a coactive pattern. This suggested that coaction serves both to express emotions and to form and maintain an ongoing relationship. Alternate interaction appears to function later in the child's development in the exchange of symbolic information. Symbolic information is information found in speech. Coaction with covocalizing seems to serve to develop bonding, membership, and develop a form of relatedness.

In one of Stern's (1974) mother-infant research undertakings, he examined the behavior of eight sets of twins and their mothers in a free play situation. Again a videotape recording machine was used to observe 3-4 month old infants and their mothers. "Turning towards"

and "turning from" behavior of the mother and infant were counted by two trained observers. The results reported suggest that it is the infant who "makes" or "breaks" the gaze. The mothers tended to maintain their gaze for longer periods until the infants either responded to their gaze or turned away from the gaze. This study showed that while the mother's mode of modulating interaction involved facial and vocal behaviors, the infants in this research used more gazing behaviors. It was presumed that the range of the infant's behavioral repertoire as he develops would become more and more similar to that of his or her care-giver.

Jaffee, Stern, and Craig (1973) examined three sets of twins, two female and one male set, at four months old. All six individuals were observed in their own home environments. Twenty-seven separate play periods were observed; 14 between infants and mothers, and 13 between infants and the experimenters. The duration of play was variable depending upon the participant's inclination to continue or terminate. It was assumed that dyadic state of nonverbal interaction follow a similar pattern in verbal interaction as in a conversation. Coding of the four categories of nonverbal dyadic states consisted of (a) neither participant speaking, (b) only person A is speaking, (c) only person B is speaking, and (d) both persons are speaking simultaneously. The simplified analysis employed in the study of conversational behavior examined four categories: (a) looking at, (b) looking away, (c) vocalizing, and (d) pausing for the other. While it was concluded that all four categories analyzed are important in the development of later conversation, early gazing behavior was regarded to be the precursor of

later gazing patterns rather than the precursor of conversational patterns. Gaze behavior in mother-infant interaction was viewed as an important element in the early dialogic system.

Another research interest is conversational synchrony which is regarded as an important element in language learning and use. Schaffer (1974), Newson and Shotter (1974), and Lewis and Lee-Painter (1974) are among those who share this view. Bateson (1975) analyzed five interactions she had with her child when he was between 49 and 105 days old. Using aspects of Bullova's (1964) collected data on five children, she developed a method of coding mother-infant conversational exchanges in her own research. The study succeeded in demonstrating the turn taking nature of mother and infant as early as two months old. While mother used sentences, the infant used vocalizations in the form of grunts, coos, sneezes, and happy vocalizations. Bateson regards this form of alternation as a basis for conversations. She also noted that while alternate vocalizing took place separately, rarely did the mother or the child interrupt one another. The second facet of this project which was aimed at describing the acoustic and temporal nature of vocalizations was temporarily left out on account of equipment inadequacies. Bateson (1975) concluded that on account of the importance of timing and sequencing in conversation, the study of language should focus on the mutuality of mother and child interaction. She expressed her view that conditioning studies should extend the procedure not only to one of the participants but to both, and to how each of the dyad conditions the other.

Outside the field of normal development, Frailberg (1974)

conducted a longitudinal study on the development of communication amongst 10 healthy, no-pattern vision blind babies. Parents of these children were of average socioeconomic standing and were described as either "adequate" or "superior" mothers. Each child was assigned two observers who conducted bi-monthly home visits. While observations were generally descriptive in nature, a 15 minute videotape recorded session of mother-infant interaction was also conducted once a month. Situations observed ranged from feeding, bathtime, playtime, diaper and clothes changes, and self occupation with toys. During the 18 month study, 25 categories of behavior were found although the article does not outline these behaviors. On the whole, the study highlighted Robson's (1968) findings, the importance of eye-to-eye contact in initiating human interaction.

The blind in Fraiberg's study were originally described as generally dull, bored, unresponsive, and perplexing. However, when selective smiling to both mother and father's voices occurred at four months, their parents became encouraged in interpreting the hand gestures these babies were using. Tickling and gross kinaesthetic stimulation also evoked smiling and laughter. The essence of early communication between these blind children and parents depended upon the adult's interpretation of hand gestures. At two to four months, the subjects maintained contact and affirmed mother's presence by adaptive exploitation with the hand in establishing human communication. At five to eight months, exploration using the fingers was established to bring about recognition or nonrecognition (e.g., toys). Hand motor expressions involved toy preference, emotional reaction, and request

to be picked up. By the end of the first year these children began to make directional reach for objects. While motor expressions served to control the blind children's immediate environment, spontaneous vocalizations were sparse and vocalizations initiating contact did not appear until the second year of the blind subjects.

Bakeman and Brown's (1977) research efforts focused on the description of a behavioral dialogic system for mother and infant interaction. Four general categories of the dialogic relationship were identified: (a) the coating state, where both participants are engaged in communication; (b) the mother alone state, where mother is acting alone; (c) the infant alone state, where the infant is acting alone; and (d) the quiescent state, where neither mother nor child is acting. Forty-five black healthy infants and their mothers from a low income group served as subjects for this study. Analysis of the observations indicated that during early infancy mothers tended to "drive" the dyadic system. Male infants apparently received more attention from their mothers. It was also found that primiparous more than multiparous mothers spent more time feeding their infants. Both researchers concluded that their behavioral descriptions of mother-infant interaction simplifies model building on account of its objectivity and replicability.

The amount of research interest shown in the dyadic relationship extends beyond infancy and the mother-infant interaction. Analysis of interaction among children was given considerable attention in a study conducted by Jamieson (1977). The results indicated that the frequency of verbal behavior was influenced by the age and by the situation

variables. All three variables influence nonverbal behaviors in the following combinations: (a) age, sex, and situation; (b) age and situation; and (c) age and sex.

Schmidt and Hore (1970) examined the relationship of verbal behavior and nonverbal behavior among 30 randomly selected five year old children. Videotaped and audiotaped recordings of structured interaction sequences of both mothers and their children provided the basis for examining nonverbal behavior such as body contact, body closeness without contact, and glancing behavior. The cooperative tasks involved the mother telling the child stories and the child copying simple designs. The results of the experiment suggested that persons with complex levels of verbal communication used glancing behavior more often during the story telling task (Hore, 1975).

The writer has encountered only three mother-child interaction studies where Skinner's functional analysis of behavior was used to describe behaviors. Horner (1968), in her study of linguistic ecology, analyzed the verbal interaction of two three-year-old negro children and members of their immediate environment. Both children came from a low socioeconomic background. Two full days were devoted to recording each child's interaction. Audio recording was done using a wireless transmitter and microphone sewn in the child's clothing. Analysis of the taped transcriptions showed that both children interacted more frequently with their mothers. Verbal interaction with other children was less frequent compared to that with other adults. The preponderance of Mands (commands, requests), and Tacts (contacts with the environment) in the interlocutors interactions were noticeable.

Mothers used more Mands in relating to their children than did the children in their interaction with their mothers. Both echoic (imitative behaviors), and Intraverbal Categories (thermatic correspondence rather than point-to-point correspondence) seldom appeared in the mother-child interaction. It was suggested that the echoic category of behavior is important in developing the verbal skills of a young child. The Intraverbal category, assumed to have a significant role in young children's repertoire, was not apparent in either children's verbal interactions.

Horner's descriptive study points to the extensive use of a functional analysis of behavior in order to map out those language features which relate to both maturational and to cultural factors. Educational intervention, by way of teaching the "disadvantaged child" how to manipulate the world through verbal behavior, was Horner's prime concern.

More recently Marshall and Hegrenes (1973) compared 20 mentally retarded children and their mothers with a sample of 20 non-retarded children and their mothers. The children's ages ranged from three to five years old. Four of Skinner's (1957) verbal operants; Mand, Tact, Echoic, and Intraverbal categories formed the basis of their comparison.

One 15 minute session between the mother and child took place in an observation room equipped with a two-way mirror and a sound system between the mother-child pairs and the researchers. The mothers were instructed to play with their child. While this was a free play situation, mothers were instructed not to read to their child.

Their findings showed that tacts, mands, and intraverbals occurred with greater frequency with the non-retarded children. Echoics occurred more frequently with the retarded children.

The frequency of tact, intraverbals, and echoics were, however, similar between mothers of non-retarded children and the mothers of retarded children. Mothers of retarded children were found to use more mands with significant frequency.

The order in which the operant categories were used by both groups of children was similar. Tacts and intraverbals were the first two frequently used categories. The mand category with third highest for the non-retarded group and fourth for the retarded children. Echoics were fourth in the non-retarded group and third in the retarded group.

The pattern of usage of verbal operants was identifical for mothers of both groups. According to their frequency of use they are mand, tact, intraverbal, and echoic.

It was suggested that the retarded children's more frequent use of the echoic category was a function of their level of development since there were differences between their chronological age (CA) and mental age (MA).

The frequent use of mands by mothers of retarded children was attributed to the following reasons: (a) due to the child's increased physical capability and decreased mental ability, the process of socialization requires a great deal of physical constraint by the mother. This is achieved by the use of mands. (b) the child's verbal expressive deficit serves to extinguish the mother's use of other operants. This leaves mother with the habitual response of manding.

(c) the child's motor performance or compliance following a mother's mand reinforces the operant.

In a similar study Gutmann and Rondal (1979) compared 21 non-retarded children and their mothers with 21 Down's syndrome children and their mothers. The children's ages in the non-retarded group ranged from 1 year, 8 months to 2 years old. Children in the retarded group were between 3 and 12 years of age. Skinner's (1957) verbal operants, mand, tact, echoic, intraverbals and autoclitics were used as a basis for comparison. The study was designed to determine whether operants produced by mothers and matched on mean length of utterance is consistent with Marshall, et al.'s (1973) findings.

Two 30 minute free play situations was recorded in the subject's home. This was done using an audiotape. Mother-child pairs were placed in one of three language levels: Level 1, mean length of utterance, 1.00 to 1.50 morphemes per utterance; Level 2, 1.75 to 2.25; and Level 3, 2.50 to 3.00. Seven Down's syndrome and seven non-retarded children were in each level.

The results reported indicate that as mean length of utterance increased, the frequency of intraverbals and total verbal operants increased, while the frequency of echoics decreased. Differences between groups for mothers and children were noted in the production of intraverbals and echoics.

In comparing the results of this study with Marshall et al.'s (1973) results, Gutmann et al. (1979) reported differences rather than agreement. Mothers and children in the present study produced more verbal operants than those in the Marshall et al. study. Marshall et al.

did not score autoclitics. The order of production of verbal operants reported by Marshall et al. for mothers in both groups was mand, tact, intraverbal, and echoic. In Gutmann et al.'s study only mothers of non-retarded children followed a similar order. Mothers of retarded children in this study followed a different order; mand, intraverbal, echoic, and tact.

Gutmann et al. (1979) reported the following:

1. Mothers of Down's syndrome children emitted, although not significantly, less mands than mothers of non-retarded children.

2. Mothers of Down's syndrome children produced significantly more intraverbals than mothers of non-retarded children.

3. All children in both studies produced more tacts than any other verbal operants.

4. All groups except the non-retarded children produced intraverbals second most frequently.

5. The non-retarded children in this study produced more echoics than intraverbals.

6. Mands occurred least frequently for the retarded children in Marshall et al.'s study. Mands occurred least frequently for the non-retarded children in this study.

Several similarities were, however, found between Gutmann et al.'s (1979) study and Rondal's (1978) study. These similarities include the following:

1. The total number of verbal operants, intraverbals, and autoclitics increased.

2. As mean length of utterance increased the frequency of echoics

decreased.

3. The proportion of tacts and mands decreased as the children's utterance level increased.

From this, Gutmann et al. (1979) suggested that mands, tacts, and echoics occur earlier in children's development than do intraverbals and autoclitics.

As previously reported by Rondal (1978), Gutmann et al. (1979) also found that non-retarded children produced significantly more echoics than Down's syndrome children.

Mothers on the other hand produced more mands than other verbal operants except the autoclitics, and the proportion of mands decreased as mean length of utterance increased.

Down's Syndrome children and their mothers also produced significantly more intraverbals than the non-retarded group.

On the basis of these results, Gutmann et al. (1979) concluded that the functional speech of Down's syndrome children and their mothers are qualitatively and quantitatively different from the functional speech of non-retarded children and their mothers.

Recently, reported use of Skinner's (1957) functional analysis of behavior appears to have increased. Studies employing verbal behavior have, however, been limited to older subjects and have concentrated on the comparison of retarded and non-retarded children and their mothers. Observations were also generally recorded on audiotape. While this method allowed for coding to take place, the nonverbal behaviors which are crucial in applying Skinner's functional analysis of behavior (1957), were unfortunately not taken into consideration. This was due to the use of an audiotape rather than a videotape.

CHAPTER III

METHOD

Subjects

Five mother-infant pairs were selected for this study. The pairs were all healthy Caucasians from educated middle-income families (one first-born male, two second-born males, and two second-born females). Four of the give infants were initially breast fed. Subjects were selected from the greater Edmonton area and the mothers were known to the researcher.

Due to a traumatic child-birth and the infant's illness, the sixth mother who agreed to participate in this study was excluded upon her request.

While the five families involved in the study had similar backgrounds, differences in the mother-infant pairs were noted. The following individual descriptions are intended to point out the variability amongst the subjects and to provide some background information on the families involved in this naturalistic and longitudinal study.

James and Mrs. Y. James and Mrs. Y were the first dyad observed. James, a full term baby, was 9 pounds 8 ounces at birth and was the second of two siblings. His father was in his final year at law school and was usually absent during observations, although he was known to help in child caring activities at home. Mrs. Y was completing a degree in education prior to James' birth. All observations were made in their two-bedroom apartment usually between the hours of 4:00 and 4:30 in the afternoon. The researcher babysat James' older sister,

Andrea, during these observations. The family talked to James in English, and occasionally in French.

James sucked vigorously and always seemed hungrier than the other infants in the study. Mrs. Y was a generally quiet and soft-spoken person. She seemed confident in responding to James' requirements and followed a regular feeding schedule.

Most observations took place as scheduled with one exception. Andrea broke her arm just before the fifth observation and consequently she refused to part from Mrs. Y. She was, therefore, included in the fifth observation session.

Christopher and Mrs. H. Observations for the H-dyad did not commence until Christopher was 22 days old. Mrs. H was not ready to receive any visitors until that time.

Christopher was a first child and was a full term baby who was 7 pounds 11 ounces at birth and fed on a demand schedule. Initially he was breast fed, but bottle feeding started after the second observation. Mrs. H was employed as a psychologist before Christopher's birth and Mr. H was a sales representative for a large organization.

The first three observations took place between 2:30 and 3:30 p.m., and the last three observations between 4:00 and 5:30 p.m. Mr. H was only present during the last observations. Usually both parents discussed Christopher's development at length with the researcher before and after each observation. The first two observations took place in Christopher's nursery room and the last four observations in the living room of the H's three-bedroom townhouse.

Brett and Mrs. N. Brett was a 9 pound 1 ounce baby who was born 10 days later than the expected delivery date. He was a second child of the N's. Mrs. N was completing speech therapy studies at the University and Mr. N worked as a personnel administrator.

Observations took place in the bedroom of the family's two-bedroom apartment. While observation dates were generally adhered to as planned, observation times varied since Brett was fed strictly on a demand schedule. Since the researcher's residence was close to the N family, the time variability in the observations did not create any undue difficulties. Mrs. N usually telephoned the researcher just before a possible feeding session.

Brett was breast fed during most of the observations except the last one. Prior to the last observation, Brett was hospitalized for flu-like symptoms which developed during a family holiday out of Edmonton. However, the illness only caused minor disruptions in the planned observation schedule.

Erin and Mrs. Mc. Mrs. Mc and Erin left the hospital two days earlier than planned. Consequently, the writer was unable to visit them. Erin is a second child and had a gestation period of nine months.

Observations took place in the nursery room between 6:30 and 8:30 p.m. in the Mc family's bungalow. During most observations when Mr. Mc was not available, the researcher babysat Erin's older brother, Trevor, in the playroom. The playroom was located beside the nursery.

Observations of Mrs. Mc and Erin started later than planned for the Mc-Dyad since Erin's sleeping schedule did not conform to the

family's rest period. She slept during the day and was awake all night. As a result, child caring became a difficult problem for Mrs. Mc who also had to care for Erin's one-year-old brother. As a consequence, observations were planned to accommodate this contingency.

Mrs. Mc was an employment counselor prior to Trevor's birth, while Mr. Mc was an appraiser. Both parents were interested in this study and were also participants of another infant research project.

Jennifer and Mrs. L. Jennifer and Mrs. L were the last dyad observed. Jennifer was born by Ceasarean section following a 40 week gestation period. She was a planned baby whose birth weight was 8 pounds 3 ounces. Prior to Jennifer's elder sister's birth, Mrs. L was employed as a social worker. Mr. L was the general manager of a business company.

All observations were taken in the TV room of the L family's bungalow, situated 30 miles southwest of Edmonton's city limits. During most observations the researcher talked to Mr. L and Susan. Observations, with the exception of the fifth, occurred as planned. Two attempts were made to conduct the fifth observation. On both occasions roads leading to the L's residence were impassable due to blizzard conditions.

The researcher's impression of Jennifer was that she was a quiet baby who usually spent most of the first few months sleeping. This was particularly noticeable during the first three observations.

Instruments

Coding System. The McLeish-Martin System for the analysis of communicative behavior (McLeish & Martin, 1975) was used in this study

for the functional analysis of interaction involving the five mother-infant pairs. The McLeish-Martin Coding System consists of ten categories based both on Kinner's verbal operants (1957), and Bales' Interaction Process Analysis (1950, 1970).

While retaining Skinner's first five categories, the mand, the tact, the extended tact, the echoic, and the intraverbal, the sixth category known as the autoclitic, has been refined into five sub-categories. They are: the dominant control autoclitic, negative control autoclitic, informative autoclitic, submissive control autoclitic, and the positive control autoclitic.

The five autoclitic categories in the McLeish-Martin coding system were essentially derived from the Bales interaction process analysis.

The Bales system is an observational method designed for the study of social and emotional behaviors in small groups. It consists of twelve categories, namely: (a) seems friendly, (b) dramatizes, (c) agrees, (d) gives suggestion, (e) gives opinion, (f) gives information, (g) asks for information, (h) asks for opinion, (i) asks for suggestion, (j) disagrees, (k) shows tension, and (l) seems unfriendly.

All of Bales' twelve categories for coding group interaction are organized into six opposite pairs to cover problems of information, evaluation, control, decision, tension, management, and integration (Appendix B). The six opposing pairs are also illustrated. Six of the twelve categories are intended for group behavior analysis, while the remaining six categories are concerned with task oriented interaction related to asking or answering questions.

The application of Bales Interaction Process Analysis is based on the formulation that group interaction involves three dimensions. The first dimension involves power, dominance, and ascendance of a person. This is represented by a vertical line. The upward direction signifies greater power, and conversely a downward direction connotes lesser power or dominance. The second dimension refers to the pleasant or unpleasant feelings a person feels in a given interaction. This is represented by a horizontal line that runs from left to right. The right hand side connotes positive feelings and is diminished as interaction moves towards the left hand side. The third dimension has a strong task orientation. It is concerned with the contribution an individual group member has made towards the achievement of a common goal or task. This line runs both forward and backwards. The forward movement suggests some contribution towards a task, and the backward movement suggests lesser or no contribution towards a task (Bales, 1968, p. 459).

In a study by McLeish and Martin (1975), and more recently McLeish (1978), empirically established the applicability of the McLeish-Martin Categories for the analysis of communicative behavior in adult groups. Oddie (1976) also used this coding system in her study on the development, implementation, and evaluation of an instructional module designed to teach communication skills in the affective domain to a group of student teachers. McLeish (1978) concurs with Oddie's findings that mand, tact, extended tact, and the discriminative use of a variety of operants characterized the effective teachers' interaction.

While the McLeish Martin categories for the analysis of behavior was validated amongst adult groups, both the pilot study (Appendix A), and the present study suggests its applicability with young infants and their mothers.

The Skinnerian communication model as reflected by the McLeish Martin coding system was found to be appropriate as an instrument for exploring early mother-child interaction, communication, and language development. The models flexibility allowed for its effective use with this population. More recent studies (Marshall et al., 1973, Rondal, 1978, and Gutmann et al., 1979), employing the unmodified Skinnerian communication model have also been useful and appropriate in exploring communication in older normal and Downs Syndrome children and their mothers.

Prior to using the McLeish Martin coding system for the present study certain modifications were made. The changes involved clearly differentiating the mother and infant responses in the written transcripts, and also distinguishing the verbal and nonverbal behaviors from the videotapes. An analysis of the antecedent stimuli was especially crucial during the preparation of the written transcripts. Without existing examples of infant nonverbal behaviors, identifying the mother's behavior was an important step in pinpointing that of the infant behavior. This simplified encoding the dyadic interactions.

Definition of Operant Categories in the McLeish-Martin Coding System

While the individual definition of the ten categories used in this study is found in Appendix C, it is important to stress that all categories were used with Skinner's tri-member contingency model in mind; S^d ------- R ------- S^r. According to Skinner, three events include a discriminated stimulus (S^d), a response (R), and a reinformcement (S^r). When this is applied to coding a response like "What are you doing?", it is important to know what happened prior to and after the emission of the behavior being coded in order to ascertain the functional nature of the behavior. The terms stimulus response and reinforcement are not intended to be descriptive, but are meant to be functional. Below is an example of an operant.

S^d -------	------- R	------- S^r
Infant is intensely staring at the camera.	Mother says to the infant "What are you doing?"	Infant turns head towards mother and away from the camera and looks at her instead.

As in any operant, the emphasis is upon the effect a behavior has on the environment, and in turn the effect it has on the individual. Skinner (1957) defines an operant as:

> . . . a unit of behavior composed of a response of identifiable form functionally related to one or more independent variables. In traditional terms we might say that we need a unit of behavior defined in terms of both 'form and meaning.' The analysis of nonverbal behavior has clarified the nature of such a unit under laboratory conditions in which the expediency of the unit may be submitted to rigorous checks . . . The kinds of behavior in which we are usually interested have . . . . an effect upon the environment which has a return effect upon the organism. Such behavior may be

> distinguished from activities which are primarily concerned with the internal economy of the organism by calling activities which operate upon the environment 'operant behavior.' Any unit of such behavior is conveniently called 'an operant.' For most purposes 'operant' is interchangeable with the traditional 'response' but the terms permit us to make the distinction between an instance of behavior ('So-and-so smoked a cigarette between 2:00 and 2:10 p.m. yesterday') and a kind of behavior ('cigarette smoking'). The term 'response' is often used for both of these although it does not carry the second meaning easily. The description of an instance of behavior does not require a description of related variables or of a functional relation. The term operant, on the other hand, is concerned with the prediction and control of a kind of behavior. Although we observe only instances, we are concerned with the laws which specify kinds. The distinction raises the issue of formation.
>
> A response, as an instance, can be completely described as a form of behavior. An operant specifies at least one relation to a variable - the effect which the behavior characteristically, though perhaps not inevitably, has upon the environment and is therefore not a purely formal unit. (pp. 20-21)

For the purposes of this study all communicative behaviors will be designated as either verbal or nonverbal, and Skinner's definition of an operant will be used. Verbal behaviors will be defined as sounds that conform to formal language or speech structure of a given community. In this study the language is English, and all gestures and sounds or vocalizations are considered to be nonverbal in nature.

Mand. As used in this study, a mand is a derivative of the word command or demand. Skinner (1957) defined mand as a verbal operant in which the response is reinforced by a characteristic consequence, and therefore is under the functional control of relevant conditions of deprivation or aversive stimulation (pp. 35-36). The mand is generally thought to work for the benefit of the speaker. Its function is to change aspects of the environment by others' actions. Compliance and subsequent change is the consequence or the reinforcement. An example

of a verbal mand is a mother saying to her baby, "Don't you put that cord in your mouth", is giving a verbal mand. Directing and molding an infant's head towards the breast to feed is an example of a nonverbal mand. An aagh sound made by the baby that results in his mother's attention is also an example of a vocal, but nonverbal mand.

Tact. The tact essentially derives from the words tactile and contact. According to Skinner (1957) a tact is a verbal operant in which a response of a given form is evoked or at least strengthened by the actual presence of a particular object or event or property of an object or event (pp. 81-82). Its function is to describe some aspects of the here and now, and the resulting reinforcement is the correspondence with accepted description (McLeish, 1978, p. 216). Examples of verbal tact are: (a) you're getting fingernails, and (b) there's fuzz in your ear. Staring at mother, or an infant staring or smacking his lips, are examples of nonverbal tacts.

Skinner points to the importance of controlling stimuli which are nonverbal in nature. This is generally made up of things in the physical environment and include physiological processes "which the speaker is said to talk about" (p. 81). More specifically, tact involves the identification and description of objects in one's environment. It also involves the statement of an ongoing physiological process, or physical state. It is generally assumed to be important in extending contact with the environment.

Extended Tact. An extended tact may be defined as a verbal operant in which a response is generated by physical properties of objects or events where the association between the speaker's behavior

and the physical properties is not commonly reinforced by the particular verbal community. It is essentially an elaboration of the tact. Extended tact was coded when the physical reference of the response was not readily accessible to the viewer or coder. "You're a hungry boy", and "That stopped the old feet" are examples of the verbal extended tact.

Echoic. The echoic category may simply be described as a repetition or imitation of sounds, words, sentences or gestures. Skinner defines an echoic as a verbal operant in which the response is under the control of verbal stimuli, such that the response has formal properties precisely the same as the stimulus. It is widely assumed to be an important operant in a young child's developing verbal repertoire (Skinner, 1957, pp. 55-56). Echoics are similar to imitation as used by Lovaas (1966) in behavioral molding procedures in teaching autistic children to speak.

Only responses repeated after a few minutes are considered under the echoic category. Thus, a poem or rhyme repeated three months after it was first learned is not considered an echoic. Two types of echoics may be distinguished for this study: self repeating echoics, and other repeating echoics. Self repeating echoics imply repetition of one's down gesture, utterances as in the example, "What's there?, What's there?" Other repeating echoics involve repeating sounds, gestures, or words made by others as in the example of a mother who says to her infant, "Are you going to give mom a goo?" The infant responds with a goo sound.

Intraverbal. The intraverbal operant is likened to the echoic operant, however, in the intraverbal category the point-to-point correspondence between a response and the preceding stimuli is absent.

The sound or gestural match is not seen as in the echoic category. Skinner defines the intraverbal as a verbal operant in which the response is thematically related but shows no point-to-point correspondence to the verbal stimulus (p. 78). The intraverbal serves to establish thematic connections and extend sense. It provides closures for others and is an indicator of comprehension.

The intraverbal operant is best explained as a chain, or an association (e.g., one, two, three, four, etc.). Two examples of the intraverbal operant in the mother-infant interaction are as follows. "Mom better not cheat you here", after the mother had gone on talking about food and how hungry her infant was for quite awhile. This is a verbal example of the intraverbal category. A mother stroking the baby's stomach after she hears and comments that she "can hear it rumbling" serves as an example of a nonverbal type of intraverbal.

Dominant Control Autoclitic. The dominant control autoclitic is defined as a verbal operant which calls attention to the speaker of what he is saying (e.g., Well . . ., Now . . .). The clicking of mother's tongue to maintain the infant's attention is an example of a nonverbal type of dominant control autoclitic. The dominant control autoclitic generally serves to maintain attention. In the teaching process, the dominant control autoclitic is important in ensuring the child's attention and his accessibility in order to absorb information that is relayed.

Negative Affective Autoclitic. Negative affective autoclitic behaviors are expressive, reactive behaviors with a negative feeling tone. McLeish (1975) defined the negative affective autoclitic as a

verbal operant which indicates a negative emotional reaction to what has been said (p. 65). It serves a cathartic purpose and encourages empathy and sympathy in the listener. "I will not" said angrily, is an example of a verbally expressed negative autoclitic. Ear scratching to show annoyance, fussing, loud crying, showing refusal to take the bottle, are all nonverbal examples of the negative autoclitic category.

Informative Autoclitic. The informative autoclitic is a verbal operant which clarifies or alters the effect of a given communication, but does so without any indication of emotion (McLeish, 1978, p. 65). In Bales' terms (1970), this represents the third vector relating to task orientation. The informative autoclitic provides a context or set for communicative acts. Resulting reinforcement shows signs of comprehension and establishes empathy. "Your daddy's coming home soon", "I think I have an itchy nose", and "It's going to be a nice day tomorrow", all said in a flat, neutral tone, are verbal examples of the informative autoclitic category. Any dramatization or gesture which clarifies other behavior (e.g., a shrug of the shoulder to indicate not knowing) is a nonverbal type of informative autoclitic.

Submissive Control Autoclitic. The submissive control autoclitic is a verbal operant which indicates passive acceptance. It provides a precondition for communicative behaviors. It manifests in attentive listening. Essentially it entails giving in but without resistance, as in a bland "yes", or in saying "alright", after the mother gives in to the infant's refusal to take the bottle. A baby in a quiescent state after being hushed from loud crying is also an example.

Positive Affective Autoclitic. The positive affective autoclitic is a verbal operant which indicates a positive reaction to what has been said or done. It serves to express behaviors with a positive feeling tone and enhances empathic or sympathetic responses of the listener. "That's a good boy", "Attaboy", "Bless you little fella", and pleasant sounding umhums, all said in a warm affirming tone of voice are some examples of the positive affective autoclitic category of a verbal type. Nonverbal examples include a mother caressing and gently stroking her baby's cheeks, tickling her baby, looking at the child's face intently with a look of admiration, a baby smiling or laughing, and happy and contented "umhum" sounds from the baby.

Recording Equipment

Four types of electronic equipment were utilized for the observations conducted in this study.

Camera. A portable Sony AV 3400 camera with a folding and retractable tripod was used. Its power source was derived from the videotape recording and playback machine pack.

Videotape Recording and Playback Machine (VTR). To ensure accurate recording and storage of mother and infant interaction, as well as facilitate coding of behaviors, a portable videotape recording machine, Sony AV 3400 was used for all observations. This equipment was normally powered by electricity, however, a 20 minute reserve battery pack was available in case of emergency. There was no reason for its use in any of the observations conducted.

Microphone. A small sensitive clip on Sony ECM 150 microphone

was used to pick up sounds made by the mothers and infants. This was found necessary since the regular VTR microphone attachement was not sensitive enough to pick up sounds emitted by the subjects in the pilot study conducted earlier (see Appendix A).

Television Monitor. An 11 inch portable Sony television monitor, Sony AV 110, was employed to play back the videotape recorded observations to parents involved in the study, usually following each observation. Both the television monitor and playback machines were also used extensively in the transcription and coding of videotapes.

Questionnaire

A modified version of the home-environment questionnaire devised by Bing (1962), and used with some variation by Bennett (1973), was administered to provide a comprehensive view of the families involved in the project and their environment. Information on the child's home environment is important in ensuring an accurate interpretation of the coded behaviors, not in isolation, but within the context of where these observations were obtained. A copy of the questionnaire is in Appendix D.

Release of Information Form

Parents who participated in the project were required to sign a consent form allowing the researcher, members of the thesis committee, and assistants to use videotape recorded sessions obtained over the three month observation period. A copy of this form is in Appendix E.

General Procedures

Locating the Subjects. One Public Health Unit within the 50 mile radius of Edmonton offered to assist the researcher in locating subjects for the study. Suggested subjects were not, however, contacted by the writer due to an alleged practice of sedating infants in that specific geographic area. Apparently the local practice of sedation calmed the infants down. Mothers known to the researcher were contacted instead.

Three to five months prior to their expected delivery date, six mothers were interviewed by the researcher. Participation was separately elicited by giving each parent a brief explanation as to the nature, purpose, and implications of the study. An outline defining what was expected of them, should they decide to join the study, was also provided. Essentially the interview covered the following points: (a) that the study was both naturalistic and longitudinal, designed to examine mother-infant interaction during the first three months of the infant's life; (b) that the purpose of the project was to describe the characteristics of the observed interaction during the feeding situation, where most of the interaction was expected to take place in the early stages of development; (c) a paucity of research in the age group; (d) that information on the usual pattern in which communication takes place is important in developing tools, techniques, and other strategies for helping children who fail to develop effective means of communication at a prescribed time; and (e) that six 15 minute videotape recorded observations of the feeding situation, taken every two weeks, over a period of three months in their respective homes would be required.

The interviews were considered crucial in encouraging participation in the project. The mothers who were approached as possible participants in the pilot study were generally reluctant to take part for at least three reasons which they stated as (a) time, (b) lack of rapport with the researcher; and (c) unknown value of the research project.

Half hour observations conducted by the researcher in the pilot study was found too long for the participating mothers' comfort. Scheduling of observations, preparations required for the observations (tidying the house), and the socializing prior and/or after the observations were found to be time consuming, especially by parents who did not know the researcher. Some of the parents felt that the required ongoing commitment to the project was overwhelming.

Parents who participated in this study indicated that they would not have joined this study if the researcher was not personally known to them.

Hospital Visit. The next step involved hospital visits. The researcher visited four of the mothers and infants in this study at the hospital within the first six or seven days after delivery. The visit served to confirm the mother's commitment to take part in the study, or to cancel the earlier agreement.

Having ensured the mother's cooperation at this time, arrangements for the first observation was made. A feeding schedule was also obtained to facilitate advanced planning for the videotaped observations when the mother returned to her home.

Schedule of Observations. The first observations were conducted

as early as practically possible upon the mother and child's return home from the hospital. These observations were made in the home. After this initial observation, subsequent observations were arranged every second week. Deviations from this schedule were generally due to holidays, illness, inclement weather, and other unforeseen circumstances. A detailed schedule of the actual observations is found in Appendix F.

While frequent observations were originally intended, due to the remarkably rapid infant growth and development expressed by authors like Crow and Crow (1962) and from the present researcher's experience from a pilot study conducted in 1976, it was felt that the mothers would find the two week interval more convenient and comfortable (Appendix A).

Observational Procedures

Prior to each observation the researcher ensured that the VTR equipment was set up where feeding usually took place; the bedroom, the nursery, or the living room. The mother was instructed by the researcher to do what she would normally do at feeding time, and was given a small microphone to fasten onto the infant's top jacket or shirt across his chest. She was informed that after the VTR was switched on, the researcher would leave the room and return after 15 minutes. This procedure was followed for all the observations conducted, however, following the first observation no instructions were given.

After each session the researcher encouraged the mothers to express any discomfort felt as a result of the observation. A discussion of the changes she may have noticed in her infant's development usually followed each observation.

A log book containing information on the time of observation, comments by the mother and/or father after the sessions, and other relevant information on the progress made by the child was kept. This information was recorded soon after each session.

Controls

The necessity of setting up controls in research settings outside the laboratory was pointed out by Ausubel (1958). Controls incorporated in this study may be summarized as follows:

1. Situation: All observations were conducted during the feeding situation. Wolff's study (1963) suggested that during the first few days the incidence and duration of the baby's alert state is minimal. The feeding situation appeared to be the best time to conduct an observation.

MacFarlane (1977) outlined six common categories into which infant researchers have divided the baby's degree of light sleep with irregular breathing and occasional restlessness; drowsy, awake, open eyes but quiet rather than excited; awake, eyes open, but actively moving; and crying.

2. Setting: Observations were conducted at home usually in the sample place where mothers preferred to feed their infants.

3. Use of the VTR enhanced accuracy of recording dyadic interaction.

4. All subjects were Caucasians whose parents were of educated middle class backgrounds.

5. Observation sessions for all subjects were conducted as close

to the 2nd, 4th, 6th, 8th, 10th, and 12th weeks of the child's life whenever practical. Meltzoff and Moore's study (1977) indicated infant imitation 12 days after birth.

6. To minimize observer intrusion after the VTR was set, both mother and infant were left alone during the entire observation.

7. Mother's reported changes in the child's behavior were recorded soon after each VTR session.

8. Data collection was done by the writer throughout the six observations. This was designed to reduce obtrusion as well as for reasons of continuity.

Editing of Videotapes

Following completion of the observations all videotapes were shown to the infants' respective parents for their approval before the transcription and analysis commenced. Parents did not request to have any portion of the tapes deleted.

Transcription of the Tapes

Four coders viewed segments of their respective tapes prior to the preparation of the written transcripts. Following this procedure they wrote mothers' verbalizations verbatim and noted actions and behaviors that were verbal in nature. The infants' vocalizations and nonverbal behaviors were noted in a similar manner.

The transcript contains two parts. The right hand column shows mothers' behaviors and the left hand colum the infants' behaviors. This served as the basis for coding the interaction on videotape. A full written transcript on the N-Dyad found in Appendix G illustrates

how behaviors were noted on paper.

Data Analysis and Tape Coding Procedures

Using the definitions from the McLeish-Martin Coding System, along with the expanded and revised coding examples, coders analyzed 28 tapes (Appendices C &H). Coding was done directly from the television monitor with the aid of written transcripts. Codes were noted on the written transcripts.

To facilitate a more efficient analysis each tape was divided into five segments, 1-3 minutes, 4-6 minutes, 7-9 minutes, 10-12 minutes, and 13-15 minutes. Only the 1-3 minute, 7-9 minute, and 13-15 minute segments were coded.

Four coders, including the researcher, were trained to use the McLeish-Martin Coding System by Dr. John McLeish. Coders were graduate students at the University of Alberta who previously received instructions on Skinner's book on Verbal Behavior (1957), through their course work. Three of these coders have had some previous experience in the use of the Bales Interaction Process Analysis in other research studies.

Each coder received approximately 20 hours of individual and group training sessions. The initial training sessions consisted of viewing the tapes observations, reviewing the definitions of the operant categories, and finally matching the behaviors on tape with the categories. One 4½-hour session was devoted to resolving differing interpretations of the ten operant categories. Disagreement relative to the use of one operant category over another was discussed and ground rules established. A 10 minute tape segment from a pilot study

was transcribed and individually coded by four coders. Interscorer reliability computed using Scott's "r" coefficient (1955) gave a range of .91 to .96. Table 1 in Appendix I presents the individually obtained coefficients for all four coders and the trainer.

Rules for Coding

The following rules were adhered to relative to the coders in this study.

1. Code all behaviors directly from the videotape using the written transcript only as a guide.

2. Code behaviors according to function and not according to formal structure. (e.g., "You are such a fine fellow" said with a strong negative tone is coded as a negative autoclitic, rather than a positive autoclitic.)

3. Code mothers' behaviors first for ease of coding mother-infant interaction.

4. Stop coding 10 seconds after the infant falls asleep. Resume coding when the infant awakes.

5. When in doubt as to which operant to code a behavior under, review the coding definition and always refer to the antecedent behavior before arriving at a conclusion.

6. Code tact for sucking, motor movements; such as an indiscriminate hand waving, kicking, and other physiological processes as in a burp.

7. Code extended tact when the physical reference to a situation is inferred, and not in the here and now, and not readily accessible

to the listener. (e.g., "You are really hungry.")

8. Code tact for plain touching without apparent affect. (e.g., wiping dust off the table, or placing bottle on the table.)

9. Code two types of echoics: self repeating, which refers to the repetition of sounds, words, or gestures one makes; other repeating echoics which refer to the repetition of sounds, words, or gestures made by others.

A copy of the revised coding examples for the present study is in Appendix H. A coded segment of a pilot tape using the rules outlined is shown in Appendix J.

CHAPTER IV

RESULTS

The major purpose of this study is to describe the patterns and characteristics of communicative behaviors of five mothers and their infants in the feeding situation. The purpose also includes an examination of how the pattern of communication changes over a three month period.

Percentages calculated for all 28 coded observations and the findings for the total sample are reported in four sections. The first section presents the range of behaviors found in the infants' interaction. The second section presents the types and possible changes of infants' behaviors over six time periods. The third section presents the range of mothers' communicative behaviors; and the fourth section presents the mothers' communicative behaviors over six time periods. The presentation of the four sections is designed to address four hypotheses presented in Chapter I. General and individual results are presented for each of the four sections.

The Infants' Range of Communicative Behaviors

General Results for Infants

As hypothesized, infants in the study will exhibit nonverbal language related behaviors. To address this hypothesis the types of communicative behaviors observed in five 2 to 13 week old infants were examined using a functional analysis of behavior. Only six out of ten types of communicative behaviors are noted. The behaviors include sucking, drinking noises, burping, yawning, kicking, stretching, looking at mother or other objects in the room, staring at the camera,

holding mother's finger, smiling, laughing, fussing, various facial expressions, gestures, as well as movements involving the upper and lower extremities. Various types of vocalizations, squeals, and cries were some of the other behaviors which were observed. For details of the infants' nonverbal behaviors, see Appendices G and H.

The data for five infants presented in Figures 1 and 2 evinces only six out of ten categories for communicative behaviors. From the highest to the lowest frequency count they are tact, negative and positive affective autoclitic, mand, submissive control autoclitic, and the echoic categories. The infants' interaction with their mothers are however characterized by a preponderance of facts, positive and negative affect; accounting for 93.19% of all observed infant behaviors. The mand, submissive control autoclitic, and echoic categories share the remaining 6.81% of responses. Calculated percentages are in Table 1.

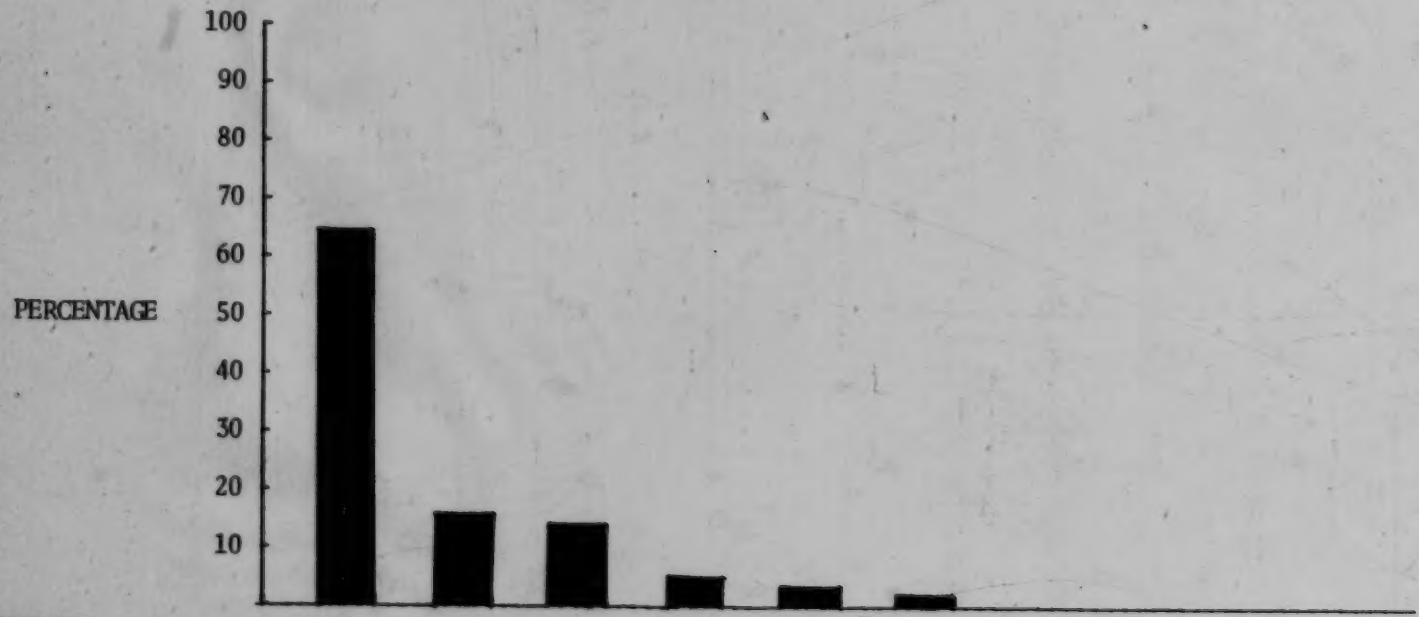
Individual Results for Infants

While a significant portion of the infants' coded interaction center around the tact category, the individual variability shown in Table 1 is noticeable in the types of observed behaviors as well as the frequency of their occurrence. The echoic category is evident in only two of the infant's interaction. A rank comparison of the six categories of communicative behaviors found in the infant subjects place tact in the first position. Both positive and negative affective categories rank second and third. The echoic category is noted in only two of the infants (Table 2). Both submissive affective

FIGURE 1

CATEGORIES FOR COMMUNICATIVE BEHAVIOR FOUND IN INFANTS

(COMBINED RESULTS FOR FIVE INFANTS)



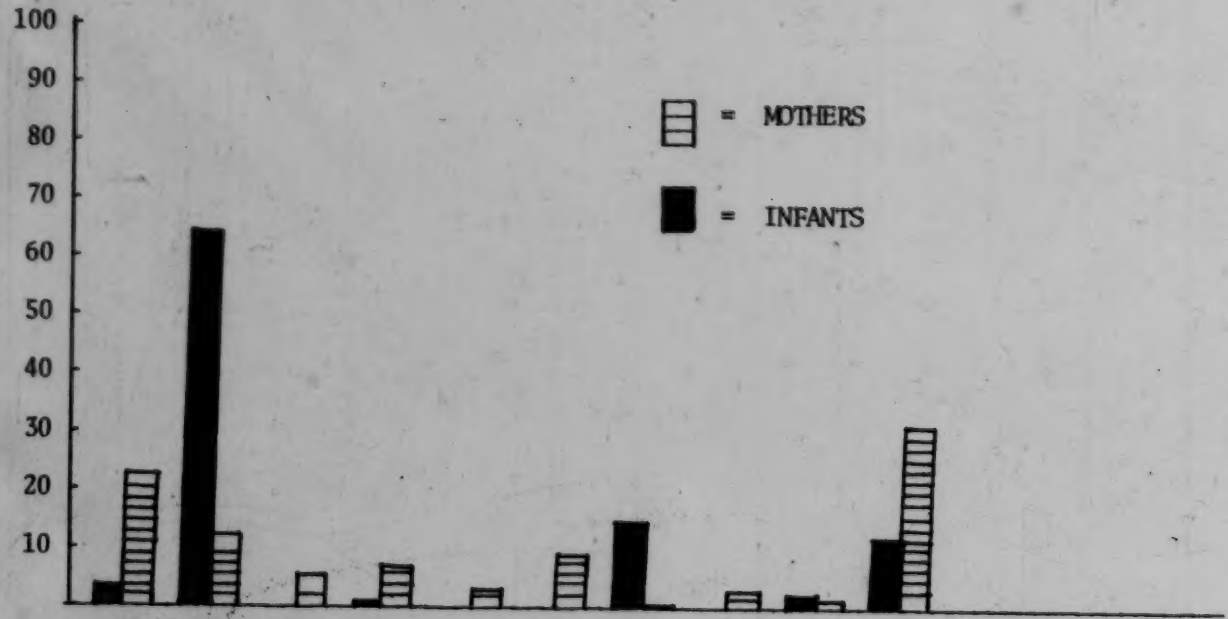
- CATEGORIES FOR COMMUNICATIVE BEHAVIORS

- COMBINED PERCENTAGES FOR ALL INFANTS (64.60) (15.51) (13.08) (3.51) (2.34) (0.96)

- KEY: T = Tact; NA = Negative Affect; PA = Positive Affect; M = Mand; SA = Submissive Affect; E = Echoic.

FIGURE 2

COMPOSITE GRAPH OF COMMUNICATIVE BEHAVIORS IN THE MOTHER-CHILD INTERACTION COMBINED FOR FIVE DYADS



- CODING CATEGORIES
- PERCENTAGES:

	M	T	ET	E	IV	DA	NA	IA	SA	PA
Infants	3.51	64.60	-	0.96	-	-	15.51	-	2.34	13.08
Mothers	23.95	12.65	5.48	7.45	4.45	9.48	0.21	2.54	1.86	31.93

- Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submission Autoclitic; PA = Positive Autoclitic.

TABLE 1

COMBINED CATEGORIES FOR COMMUNICATIVE BEHAVIOR

FOR ALL 5 DYADS (EXPRESSED IN PERCENTAGES)

	Y Dyad		H Dyad		N Dyad		Mc Dyad		L Dyad		Totals	
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother
M	1.73	22.26	7.42	20.97	0.32	23.78	0.52	23.39	4.57	29.38	3.51	23.95
T	80.63	15.96	56.63	12.23	45.03	11.99	53.99	21.18	86.69	1.89	64.60	12.65
ET	-	4.28	-	5.06	-	8.62	-	5.46	-	3.98	-	5.48
E	-	7.94	-	6.97	4.16	13.07	0.65	6.19	-	3.01	0.96	7.45
IV	-	1.65	-	10.69	-	1.86	-	4.12	-	3.93	-	4.45
DA	-	4.96	-	13.55	-	2.66	-	9.19	-	17.02	-	9.48
NA	10.91	0.16	26.32	0.73	17.99	0.08	15.42	0.10	6.92	-	15.51	0.21
IA	-	0.55	-	3.75	-	2.33	-	3.24	-	2.84	-	2.54
SA	4.65	0.34	0.44	6.60	0.41	1.50	4.40	0.88	1.82	-	2.34	1.86
PA	2.08	41.90	9.19	19.45	32.09	34.11	22.02	26.25	-	37.95	13.08	31.93

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA - Submissive Autoclitic; PA = Positive Autoclitic

TABLE 2

FIVE INFANTS' COMMUNICATIVE BEHAVIORS INDIVIDUALLY RANKED

	James Y.		Christopher H.		Brett N.		Erin Mc.		Jennifer L.	
Rank	Category	%	Category	%	Category	%	Category	%	Category	%
1	T	80.63	T	56.63	T	45.03	T	53.99	T	86.68
2	NA	10.91	NA	26.32	PA	32.09	PA	22.02	NA	6.92
3	SA	4.65	PA	9.19	NA	17.99	NA	15.42	M	4.57
4	PA	2.08	M	7.42	E	4.16	SA	4.40	SA	1.82
5	M	1.73	SA	0.44	M	0.32	M	3.52	-	-
6	-	-	-	-	SA	0.41	E	0.65	-	-

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

autoclitic and mand categories did not attain a common rank throughout the six observations. Computations for each observation is in Appendix K.

James Y. Only five of the six categories for communicative behaviors coded for infants are found in James' interaction with Mrs. Y. The echoic category is not evident in James' observed behaviors. The tact category which represents 80.63% of his total coded behaviors consists of nonverbal behaviors like sucking, burping, staring, or looking at mother. The remaining 19.37% is distributed amongst four other categories. They are negative affect, submissive control, positive affect, and mand categories (Table 1).

Christopher H. The majority of Christopher's interaction falls under two types of communicative behaviors; the tact and negative affective categories, which represent 82.85% of his observed behaviors. The tact behavior include sucking, looking at mother, holding his bottle, gulps, grunts, and whimpers. The frequency of negative affect in Christopher's interaction compared to the other infants is higher and represents one-fourth of his entire interaction. The positive affect, mand, and submissive control categories account for 17.05% of his interaction. The echoic category is missing. Negative affective behaviors include crying and fussing. Contented gulping sounds are examples of Christopher's positive affective behaviors (Table 1).

Brett N. All six categories for communicative behaviors are found in Brett's interaction with Mrs. N. The tact, positive and

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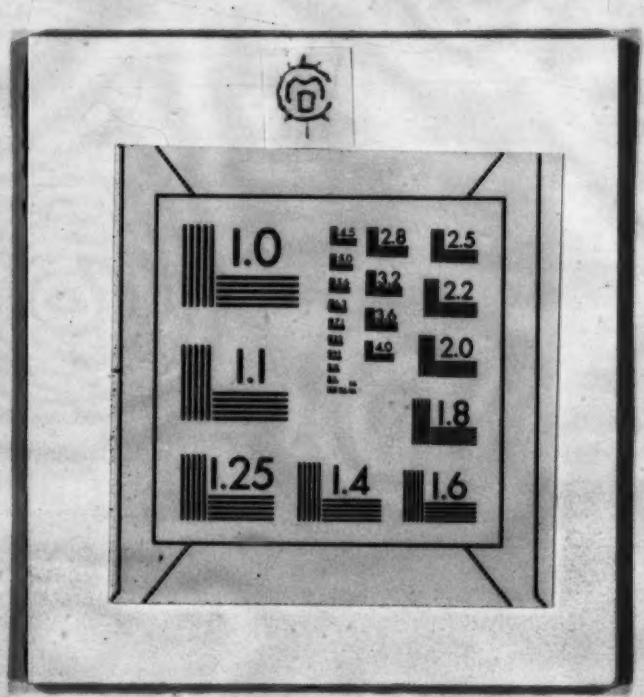


negative affect represent 95.11% of his interaction, while the echoic category represents 4.16% of his total interaction. Combined frequencies for the mand and submissive control categories is negligible (.73%).

Tact behaviors for Brett include sucking, grabbing the microphone cord, and looking at the camera. Smiling, laughing, and cooing in response to his mother's talking are some of his positive affective behaviors. Crying and yelling, and ear scratching to show annoyance are some of his negative affective behaviors (Table 1). See Appendix G for Brett's full written transcript.

Erin Mc. All six categories for communicative behaviors are also noticeable in Erin's interaction with Mrs. Mc. The greater bulk of her interaction was coded under tact, positive and negative affective categories which totals 91.43%. The submissive control, mand, and echoic categories account for the remaining interaction.

Yawning, stretching, holding mother's finger, sucking noises, burping, lip smacking, looking at Mrs. Mc, and sitting on her mother's knee are some of Erin's behaviors which were coded under the tact category. Pleasant and happy um, he sounds as Mrs. Mc was talking to her are some of the observed positive affective behaviors. Negative affective behaviors include fussing and crying (Table 1).

Jennifer L. Communicative behaviors gleaned from Jennifer's observed behaviors mainly involve the tact category which represents 86.69% of her total interaction. Only four out of six operant categories found in all of the other infants are in Jennifer's

repertoire. The three remaining categories include netative affect, mand, and submissive control. The positive affect and echoic categories are absent in her protocol.

Jennifer's observed behaviors coded under tack are sucking, drinking noises, lip smacking, ah ha sounds, arm movements, sneezing, kicking, burping, and hand waving. Negative affective behaviors include squealing, crying, fretting, and whimpering.

The Infants' Communicative Behaviors Over Six Time Periods

General Results for Infants

It was hypothesized that the range of infants' communicative behaviors will be narrower at the earlier stage and the range of behaviors is expected to widen over time. Infants' nonverbal behaviors during the first three months of life were examined and the findings reported here are based on six time periods when the home observations were taken.

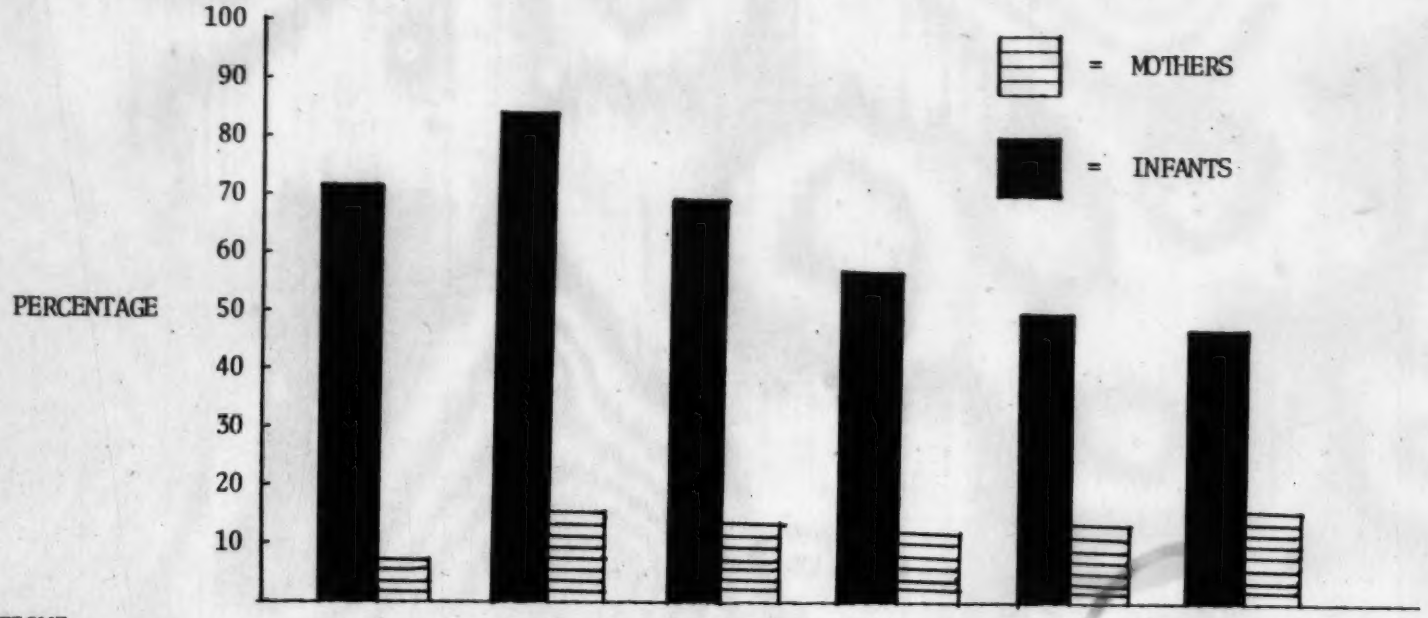
Six types of nonverbal behaviors during feeding are identified for the infants in this study. In order of their frequencies they are: tact, negative and positive affect, mand, submissive control, and echoic categories (Figures 3, 4, 5, 6, 7, and 8). With the exception of the echoic and submissive control categories, all five other types of behaviors are observed in all of the time periods when the infants were between 2 weeks and six days old to 13 weeks and 1 day old (Table 3). The submissive control category is absent in the second observation. The echoic is first noted in the second time period when the infants were 4 weeks and 5 days old. It did not reappear again

FIGURE 3

INFANTS AND MOTHERS PERCENTAGE OF TACTS

FOR THE FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATIONS

(COMBINED RESULTS ACROSS SIX TIME PERIODS)



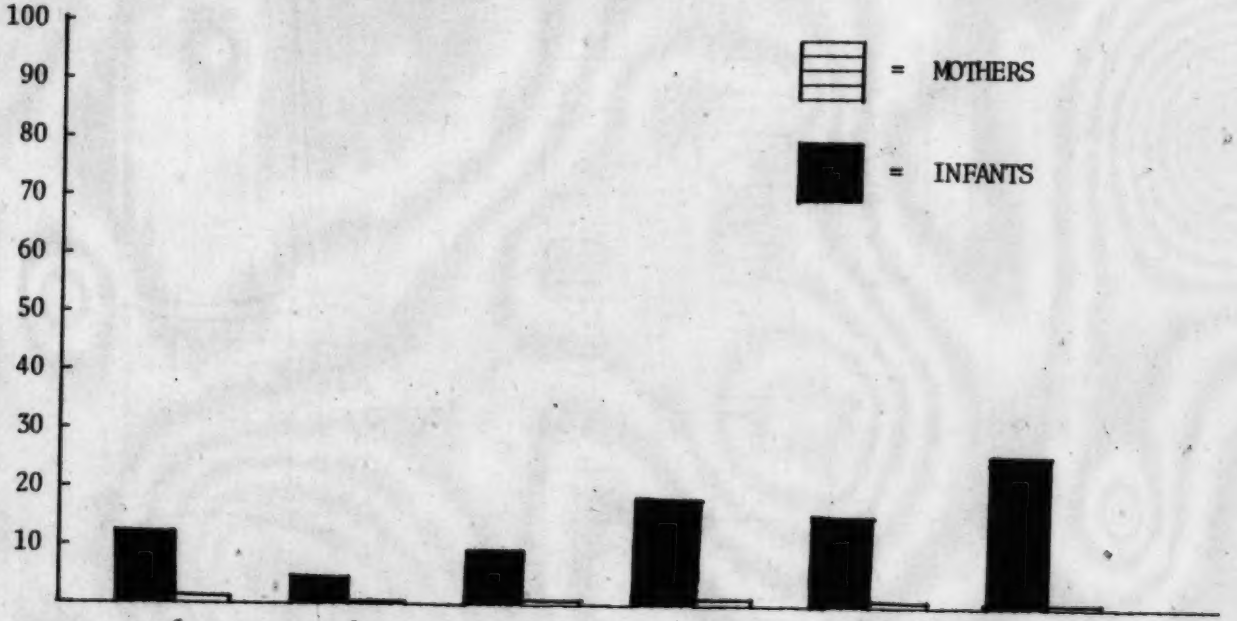
	1	2	3	4	5	6
- OBSERVATIONS						
- INFANTS' AGE IN WEEKS	2.6	4.5	6.7	8.9	10.8	13.1
- PERCENTAGE OF TACTS:						
Infants ($\bar{X}$ = 64.81)	72.10	84.70	70.66	58.07	53.59	49.76
Mothers ($\bar{X}$ = 13.13)	6.86	15.90	14.71	12.20	12.29	16.81

FIGURE 4

INFANTS AND MOTHERS

PERCENTAGE OF NEGATIVE AFFECT FOR THE
FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATIONS

(COMBINED RESULTS ACROSS SIX TIME PERIODS)



- OBSERVATIONS	1	2	3	4	5	6
- INFANTS' AGE IN WEEKS	2.6	4.5	6.7	8.9	10.8	13.1
- PERCENTAGE OF NEGATIVE AFFECT IN:						
Infants ($\bar{X}$ = 15.40)	13.16	4.70	10.29	20.72	16.85	26.68
Mothers ($\bar{X}$ = 0.22)	0.39	0.07	0.11	0.39	0.28	0.08

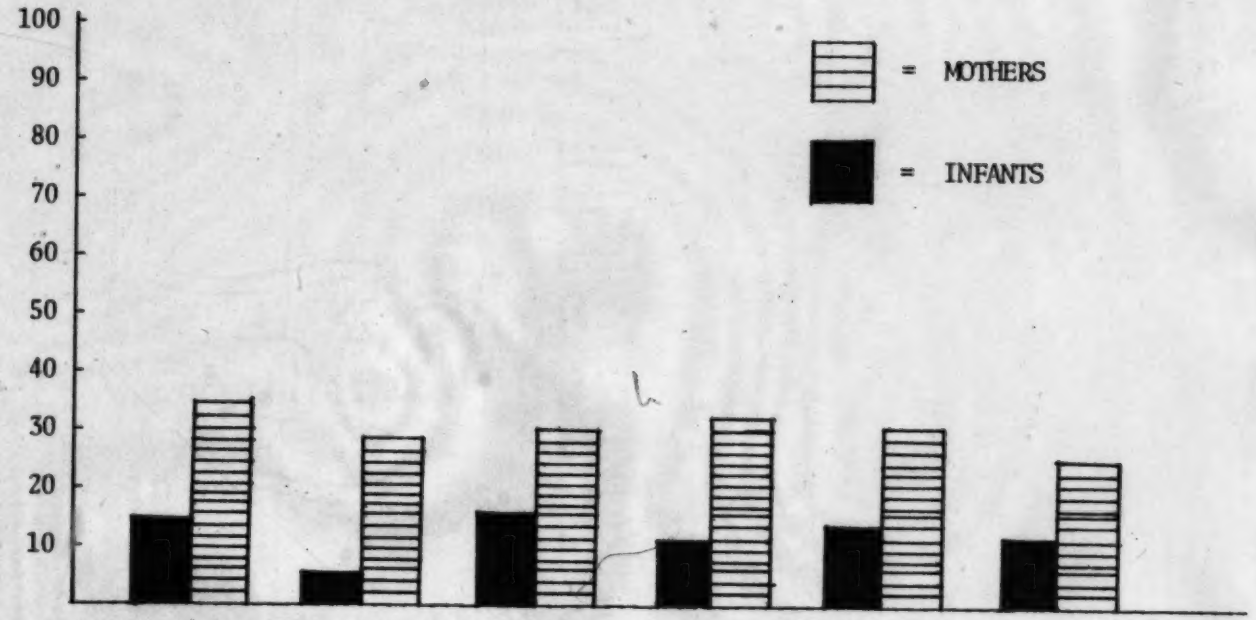
FIGURE 5

INFANTS AND MOTHERS

PERCENTAGE OF POSITIVE AFFECT FOR THE

FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATIONS

(COMBINED RESULTS ACROSS SIX TIME PERIODS)



- OBSERVATIONS	1	2	3	4	5	6
- INFANTS' AGE IN WEEKS	2.6	4.5	6.7	8.9	10.8	13.1
- PERCENTAGE OF POSITIVE AFFECT IN:						
Infants ($\bar{X}$ = 12.73)	12.69	6.30	16.84	12.04	15.26	13.22
Mothers ($\bar{X}$ = 31.53)	35.33	29.01	31.18	34.79	30.99	27.87

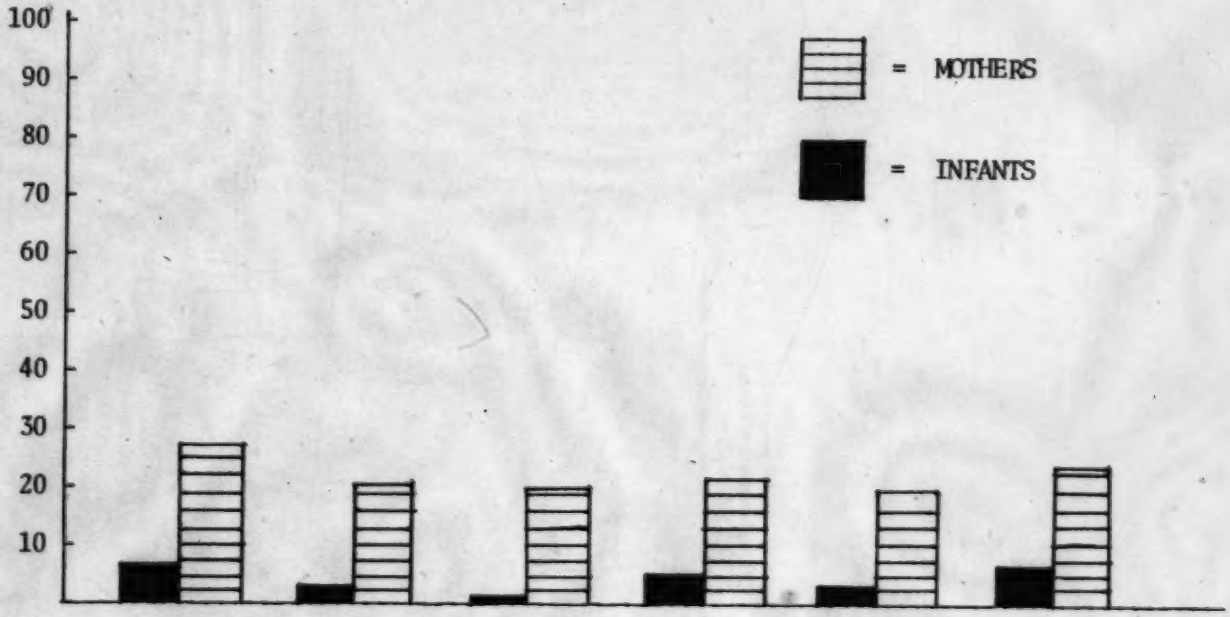
FIGURE 6

INFANTS AND MOTHERS

PERCENTAGE OF MANDS FOR THE

FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATIONS

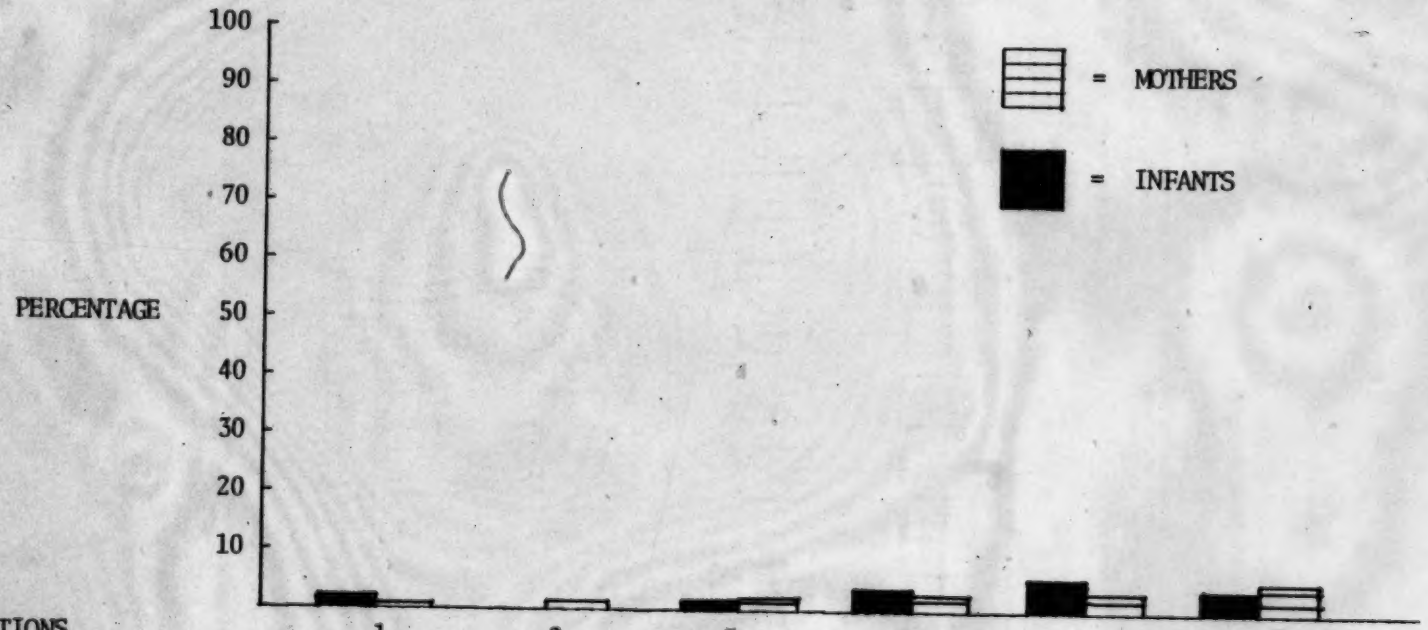
(COMBINED RESULTS ACROSS SIX TIME PERIODS)



- OBSERVATIONS	1	2	3	4	5	6
- INFANTS' AGE IN WEEKS	2.6	4.5	6.7	8.9	10.8	13.1
- PERCENTAGE OF MANDS:						
Infants ($\overline{X}$ = 3.58)	0.66	3.33	1.14	5.65	3.64	7.08
Mothers ($\overline{X}$ = 23.64)	27.42	21.96	21.66	23.47	21.50	25.80

FIGURE 7

INFANTS AND MOTHERS PERCENTAGE OF SUBMISSIVE AFFECT FOR THE FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATIONS (COMBINED RESULTS ACROSS SIX TIME PERIODS)



- OBSERVATIONS	1	2	3	4	5	6
- INFANTS' AGE IN WEEKS	2.6	4.5	6.7	8.9	10.8	13.1
- PERCENTAGE OF SUBMISSIVE AFFECT IN:						
Infants ($\bar{X}$ = 2.46)	1.39	0	1.07	3.52	5.70	3.07
Mothers ($\bar{X}$ = 1.94)	0.62	0.94	1.13	2.10	2.86	4.01

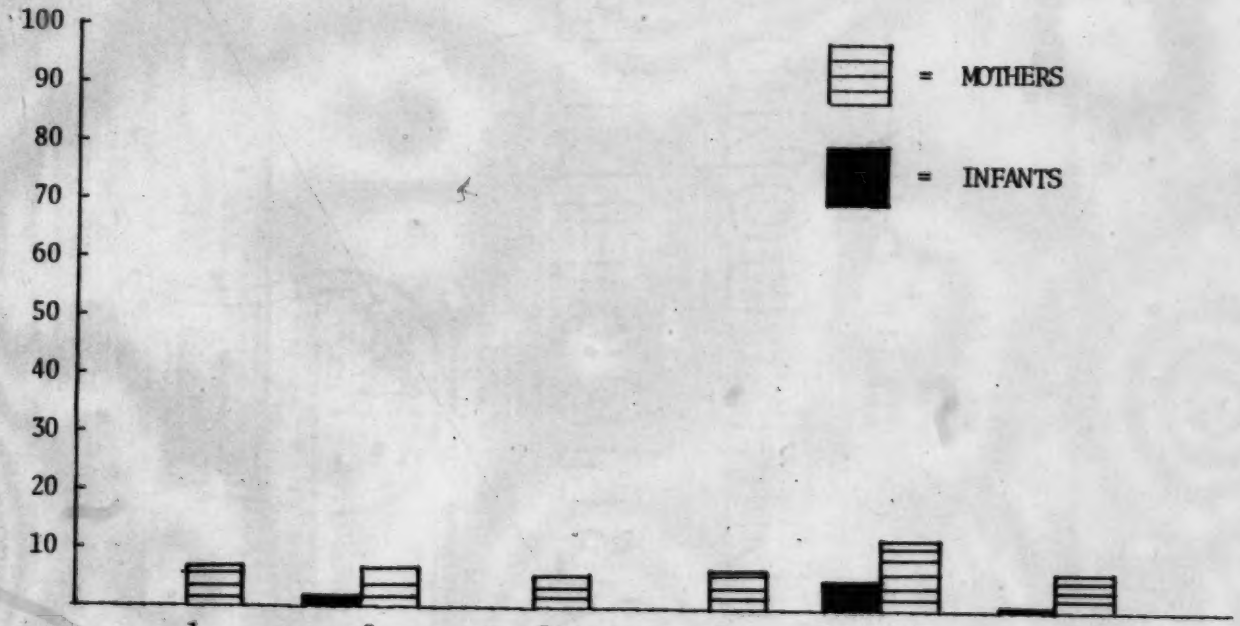
FIGURE 8

INFANTS AND MOTHERS

PERCENTAGE OF ECHOICS FOR THE

FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATIONS

(COMBINED RESULTS ACROSS SIX TIME PERIODS)



	1	2	3	4	5	6
- OBSERVATIONS						
- INFANTS' AGE IN WEEKS	2.6	4.5	6.7	8.9	10.8	13.1
- PERCENTAGE OF ECHOICS:						
Infants ($\bar{X}$ = 1.02)	0	0.97	0	0	4.96	0.19
Mothers ($\bar{X}$ = 7.56)	7.02	6.54	5.92	6.21	13.33	6.34

TABLE 3

COMBINED INFANTS' COMMUNICATIVE BEHAVIORS RANKED FOR EACH TIME PERIOD

	1ST OBSERVATION		2ND OBSERVATION		3RD OBSERVATION		4TH OBSERVATION		5TH OBSERVATION		6TH OBSERVATION	
Age:	2.6 weeks		4.5 weeks		6.7 weeks		8.9 weeks		10.8 weeks		13.1 weeks	
Rank	Category	%	Category	%	Category	%	Category	%	Category	%	Category	%
1	T	72.10	T	84.70	T	70.66	T	58.07	T	53.59	T	49.76
2	NA	13.16	PA	6.30	PA	16.84	NA	20.72	PA	15.26	NA	26.68
3	PA	12.69	NA	4.70	NA	10.29	PA	12.04	NA	16.85	PA	13.22
4	SA	1.39	M	3.33	M	1.14	M	5.65	SA	5.70	M	7.08
5	M	0.66	E	0.97	SA	1.07	SA	3.52	E	4.96	SA	3.07
6	-	-	-	-	-	-	-	-	M	3.64	E	0.19

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

until the fifth and sixth observations when the mean ages of the infants were 10 weeks and 8 days, and 13 weeks and 1 day old respectively. A percentage breakdown for each of the six observations is in Appendix K.

As demonstrated in Figure 3, the tact category emerges as the most frequently observed type of nonverbal behavior in infants of this study with a percentage range of 49.76% to 84.70%, and a mean percentage of 64.81. There is a noticeable frequency decrease in the tact category as the infants increased in age. A frequency increase or decrease over time was not evident with the five other categories found in infants of this study.

Both negative and positive affective categories occupy second and/or third positions all throughout the six observations with calculated means of 15.40% and 12.73% respectively (Figures 4 & 5). The three types of nonverbal behaviors; tact, negative and positive affect, observed over six time periods combine to account for 92.94% of all infants interaction. The mand category with a mean percentage of 3.58 is also noted across six time periods, while the echoic category with a mean percentage of 1.02 is found in only three time periods; the second, fifth, and sixth time period (Figure 7).

To ensure clarity of the results obtained for infants, the six types of nonverbal behaviors found; tact, negative and positive affect, mand, submissive control, and echoic categories are separately presented.

The Six Categories Observed in Infants Over Six Time Periods

Tact. The tact category which essentially derives from the words contact and tactile, serves to extend contact with the environment (Skinner, 1957), and describes some aspects of the here and now (McLeish, 1978).

While tact is a frequently used behavioral category in the infant subjects interaction, a close examination of the results shown in Figure 3 suggests a steady decrease in its use over the five time periods. Therefore the frequency of tacts decrease with the infant's increase in age.

Negative and Positive Affective Autoclitic. Negative affect as expressed in cries, and squeals; and positive affect as manifested in smiles, coos, and synchronized vocalizations in response to mother's verbal behaviors, are both found across the time periods in the infant's combined data. While this is so, a change in their pattern across time periods is however not apparent (Figures 4 and 5).

Mand and the Submissive Control Autoclitic. Mand which is synonymous with the word command or request, and functions to change aspects of the environment through other's acts (Skinner, 1957), is noted across the six time periods in the infant's interaction (Figure 6). This category is typified by the nonverbal behaviors that forces mother to take away the bottle or breast as the child is refusing to feed. Low frequencies are noted for this type of behavior and no discernable pattern has emerged over the three month period in which the observations took place.

Submissive control autoclitic, which denotes compliance, as

shown in the infant's conformity through attentive listening to his mother, or other similar instances of compliance is another type of behavior observed across time periods except the second. The submissive affect represents 2.46% of the infants' total interaction (Figure 7).

Echoic. The echoic category which essentially involves the vocal or nonverbal imitation of behaviors is also noted. An approximation of a goo sound a mother is uring her infant to imitate is an example of a nonverbal echoic behavior. While the mean percentage obtained is rather small (1.02%), Figure 8 shows that this type of behavior is observed in only three time periods, and produced by only two of the infants.

Individual Results for Infants

While the combined results outlined above describe the changes of all infants' nonverbal behaviors over six time periods and indicate the emergence of five types of behaviors at time one and the subsequent appearance of the echoic category at time two, five and six, individual differences are also noted. The following individual treatment of results are presented to emphasize these differences. Appendix K provides a percentage breakdown for all time periods.

James Y. James' interaction is generally characterized by a relatively high incidence of the tact category (80.63%). Following the second observation, a steady decrease in frequency of the tact category is noted. A decrease from 93.10% at the first observation to 59.38% at the sixth time period is evident (Table 4). Four other types of behaviors were observed in James' interaction. They are the negative

TABLE 4

OBSERVED BEHAVIORS FOR JAMES AND MRS. Y.: A PERCENTAGE BREAKDOWN

	First		Second		Third		Fourth		Fifth		Sixth		Totals	
AGE:	2.0		4.0		6.0		8.0		9.9		12.9			
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother
M	-	23.90	-	21.50	2.02	18.84	1.01	20.19	5.80	18.18	1.56	30.99	1.73	22.26
T	93.10	15.72	93.60	19.63	76.77	21.74	79.80	15.38	81.16	10.61	59.38	12.68	80.63	15.96
ET	-	4.40	-	4.67	-	9.42	-	2.88	-	1.52	-	2.82	-	4.28
E	-	10.06	-	10.28	-	4.35	-	9.62	-	9.09	-	4.23	-	7.94
IV	-	1.89	-	2.80	-	1.45	-	0.96	-	-	-	2.82	-	1.65
DA	-	8.81	-	9.35	-	2.17	-	0.96	-	-	-	8.45	-	4.96
NA	0.86	-	1.60	-	16.16	-	11.11	0.96	2.90	-	32.81	-	10.91	0.16
IA	-	-	-	1.87	-	-	-	-	-	-	-	1.41	-	0.55
SA	4.31	0.63	-	-	5.05	-	5.05	-	7.24	-	6.25	1.41	4.65	0.34
PA	1.72	34.59	4.80	29.91	-	42.03	3.03	49.04	2.90	60.61	-	35.21	2.08	41.90

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

affective, submissive control, positive affective, and mand categories which comprise 19.37% of his observed nonverbal behaviors.

Christopher H. Over half of Christopher's nonverbal behaviors (56.63%) fall under the tact category (Table 5). With an increase in age the frequency for this category shows a steady decrease. All of the nonverbal behaviors coded under mand and reported in the infants' combined results for the first time period belong to Christopher. All other infants did not show the mand until the second or third time period. The negative and positive affective categories place second and third. The three categories combine to represent 92.14% of Christopher's total interaction. The mand and submissive control categories share the remaining 7.86%. Christopher's observed mand behaviors account for the mand percentage reported at time one.

Brett N. While the tact category obtained the highest percentage rating for Brett N's interaction, this represents less than half of his total interaction over five time periods. Due to equipment failure only five observations were coded. See Appendix G for details. The tact category is followed by a relatively high percentage of positive affect, and the negative affective category places third. These three categories account for 95.11% of Brett N's observed interaction. The remaining 4.87% is distributed amongst the echoic, mand, and submissive control categories. It is however noted that 86.49% of the echoic behaviors reported in the combined results of this study were observed in Brett's fifth and sixth time periods (Table 6, Figure 7).

TABLE 5

OBSERVED BEHAVIORS FOR CHRISTOPHER AND MRS. H.: A PERCENTAGE BREAKDOWN

	First		Second		Third		Fourth		Fifth		Sixth		Totals	
AGE:	3.1		5.0		7.7		9.7		11.6		14.0			
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother
M	3.29	39.22	11.36	21.46	3.70	16.38	11.84	11.62	4.32	17.14	10.00	20.00	7.42	20.97
T	68.42	0.49	77.27	16.89	72.84	5.08	72.37	5.56	43.88	9.39	5.00	36.00	56.63	12.23
ET	-	7.35	-	3.65	-	6.78	-	6.06	-	6.53	-	-	-	5.06
E	-	8.82	-	7.76	-	5.65	-	10.61	-	8.98	-	-	-	6.97
IV	-	9.80	-	10.96	-	18.08	-	13.13	-	8.16	-	4.00	-	10.69
DA	-	11.76	-	6.39	-	15.25	-	19.19	-	16.73	-	12.00	-	13.55
NA	13.16	1.96	11.36	-	22.22	0.56	14.47	1.01	36.69	0.82	60.00	-	26.32	0.73
IA	-	1.47	-	1.37	-	3.95	-	5.56	-	6.12	-	4.00	-	3.75
SA	2.63	2.45	-	3.20	-	5.65	-	4.55	-	7.76	-	16.00	0.44	6.60
PA	12.50	16.67	-	28.31	1.23	22.60	1.32	22.73	15.11	18.37	25.00	8.00	9.19	19.45

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

TABLE 6

OBSERVED BEHAVIORS FOR BRETT AND MRS. N.: A PERCENTAGE BREAKDOWN

AGE:	First 2.0		Second 4.0		Third 5.9		Fourth 7.9		Fifth 10.3		Sixth 12.9		Totals	
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother
M	-	21.05			-	28.80	-	23.58	-	24.07	1.60	21.43	0.32	23.78
T	43.43	8.10			23.85	16.30	53.04	12.74	37.13	9.26	67.73	13.53	45.03	11.99
ET	-	7.29			-	5.98	-	10.38	-	7.41	-	12.04	-	8.62
E	-	4.05	Inaudible Tape		-	10.87	-	8.02	19.83	28.52	0.96	13.91	4.16	13.07
IV	-	1.62			-	1.63	-	2.36	-	2.96	-	0.75	-	1.86
DA	-	2.43			-	3.26	-	4.25	-	2.22	-	1.13	-	2.66
NA	29.56	-			5.17	-	25.41	-	12.24	-	17.57	0.38	17.99	0.08
IA	-	2.02			-	3.80	-	0.94	-	0.74	-	4.14	-	2.33
SA	-	-			0.29	-	1.10	3.77	-	1.85	0.64	1.88	0.41	1.50
PA	27.01	53.44			70.69	29.35	20.44	33.96	30.80	22.96	11.50	30.83	32.09	34.11

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

Erin Mc. Similarly, Erin's interaction is characterized by a large bulk of the tact category, followed by the two affective categories, positive and negative affect. The combined percentages for these types of behavior represent 91.43% of Erin's total interaction. The remaining 8.57% are shared by the submissive affect, mand, and echoic category. The first set of echoic behaviors reported in the combined results section at time two belong to Erin (Table 7, Figure 7). Her echoic behaviors account for 13.51% of the overall echoic behavior reported for this study.

Jennifer L. Only four out of the six types of nonverbal behaviors reported for infants in this study is found in Jennifer's interaction. They are tact, negative affect, mand, and submissive control categories. The positive affect found in other infants' protocol, and the echoic category found only in Brett N and Erin Mc's interaction were absent in Jennifer's repertoire of nonverbal behaviors during six observations.

Jennifer's interaction during the first three time periods consist mainly of the tact category. From the fourth observation her nonverbal behaviors resemble those of the other infants in the study with exception of the positive affect and echoic categories. With an increase in age a decrease in the use of the tact category is also noted in Jennifer's interaction. The tact category represent 86.69% of her total observed behaviors and the remaining 13.31% is distributed amongst the negative affect, mand, and submissive control categories (Table 8).

TABLE 7

OBSERVED BEHAVIORS FOR ERIN AND MRS. Mc.: A PERCENTAGE BREAKDOWN

	First		Second		Third		Fourth		Fifth		Sixth		Totals	
AGE:	3.4		5.7		7.7		10.7		11.6		13.9			
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother
M	-	26.14	1.94	22.44	-	22.60	6.30	18.63	4.44	26.61	8.45	23.90	3.52	23.39
T	55.56	7.95	67.96	25.21	79.82	28.75	27.56	27.33	52.22	19.88	40.85	18.01	53.99	21.18
ET	-	6.82	-	4.43	-	5.65	-	5.28	-	5.81	-	4.78	-	5.46
E	-	9.09	3.88	7.20	-	5.41	-	2.80	-	6.73	-	5.88	0.65	6.19
IV	-	2.27	-	6.37	-	4.42	-	5.28	-	4.89	-	1.47	-	4.12
DA	-	19.89	-	8.86	-	4.91	-	4.04	-	10.09	-	7.35	-	9.19
NA	22.22	-	5.83	0.28	7.89	-	28.35	-	15.56	0.31	12.68	-	15.42	0.10
IA	-	2.27	-	6.09	-	4.67	-	1.24	-	1.83	-	3.31	-	3.24
SA	-	-	-	0.55	-	-	2.36	2.17	15.56	1.83	8.45	0.74	4.40	0.88
PA	22.22	25.57	20.39	18.56	12.28	23.59	35.43	33.23	12.22	22.02	29.58	34.56	22.02	26.25

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

TABLE 8

OBSERVED BEHAVIORS FOR JENNIFER AND MRS. L.: A PERCENTAGE BREAKDOWN

	First		Second		Third		Fourth		Fifth	Sixth		Totals	
AGE:	2.0		4.0		6.0		8.0		-	11.9			
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby Mother	Baby	Mother	Baby	Mother
M	-	26.80	-	22.43	-	21.67	9.09	43.33		13.79	32.69	4.57	29.38
T	100.00	2.06	100.00	1.87	100.00	1.67	57.58	-		75.86	3.85	86.69	1.89
ET	-	3.09	-	6.54	-	5.00	-	3.33	Attempted	-	1.92	-	3.98
E	-	3.09	-	0.93	-	3.33	-	-	Twice.	-	7.69	-	3.01
IV	-	5.16	-	3.74	-	5.00	-	-	- Inclement	-	5.77	-	3.93
DA	-	11.34	-	23.36	-	21.67	-	13.33	Weather	-	15.38	-	17.02
NA	-	-	-	-	-	-	24.24	-	- Equipment	10.35	-	6.92	-
IA	-	2.06	-	1.87	-	3.33	-	5.00	Breakdown	-	1.92	-	2.84
SA	-	-	-	-	-	-	9.09	-		-	-	1.82	-
PA	-	46.39	-	39.25	-	38.33	-	35.00		-	30.77	-	37.95

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

The Mothers' Range of Communicative Behaviors

General Results for Mothers

One of two hypotheses put forward for the five months in this study is concerned with the range of communicative behaviors they use with their infants in the feeding situation. It is hypothesized that the mothers will show a wider range of communicative behaviors than their infants on account of their maturity. To answer this hypothesis the types of communicative behaviors, including verbal and nonverbal, are examined in five mothers as they interact with their infants.

An analysis of the mothers' combined interaction show that all ten types of communicative behaviors are used in the feeding situation. Table 2 and Figure 2 show that mothers' communicative behaviors fall under one of the three major categories. In order of their frequencies they are the positive affect, mand, and tact categories. While the majority of the mothers' observed behaviors are classified under these three types of communicative behaviors, a more variable profile characterizes their interaction. As expected, the mothers show a wide repertoire of behaviors that are both verbal and nonverbal in nature. The other seven categories account for the remaining 31.47% (Figure 9).

Individual Results for Mothers

A separate examination of the mothers' individual profiles show an overall consistent pattern. A varied operant profile with a generally high percentage of positive affect, mand, and tact categories. Negative affect appears in negligible amounts ranging from .08% to .73% (Table 9). Individual variability among mothers with respect to the

TABLE 9

MOTHERS' COMMUNICATIVE BEHAVIORS INDIVIDUALLY RANKED

Rank	Mrs. Y.		Mrs. H.		Mrs. N.		Mrs. Mc.		Mrs. L.	
	Category	%	Category	%	Category	%	Category	%	Category	%
1	PA	41.90	M	20.97	PA	34.11	PA	26.25	PA	37.95
2	M	22.26	PA	19.45	M	23.78	M	23.39	M	29.38
3	T	15.96	DA	13.55	E	13.07	T	21.18	DA	17.02
4	E	7.94	IV	10.69	T	11.99	DA	9.19	ET	3.98
5	DA	4.96	T	12.23	ET	8.62	E	6.19	IV	3.93
6	ET	4.28	E	6.97	DA	2.66	ET	5.46	E	3.01
7	IV	1.65	ET	5.06	IA	2.33	IV	4.12	IA	2.84
8	IA	0.55	SA	6.60	IV	1.86	IA	3.24	T	1.89
9	SA	0.34	IA	3.75	SA	1.50	SA	0.88	-	-
10	NA	0.16	NA	0.73	NA	0.08	NA	0.10	-	-

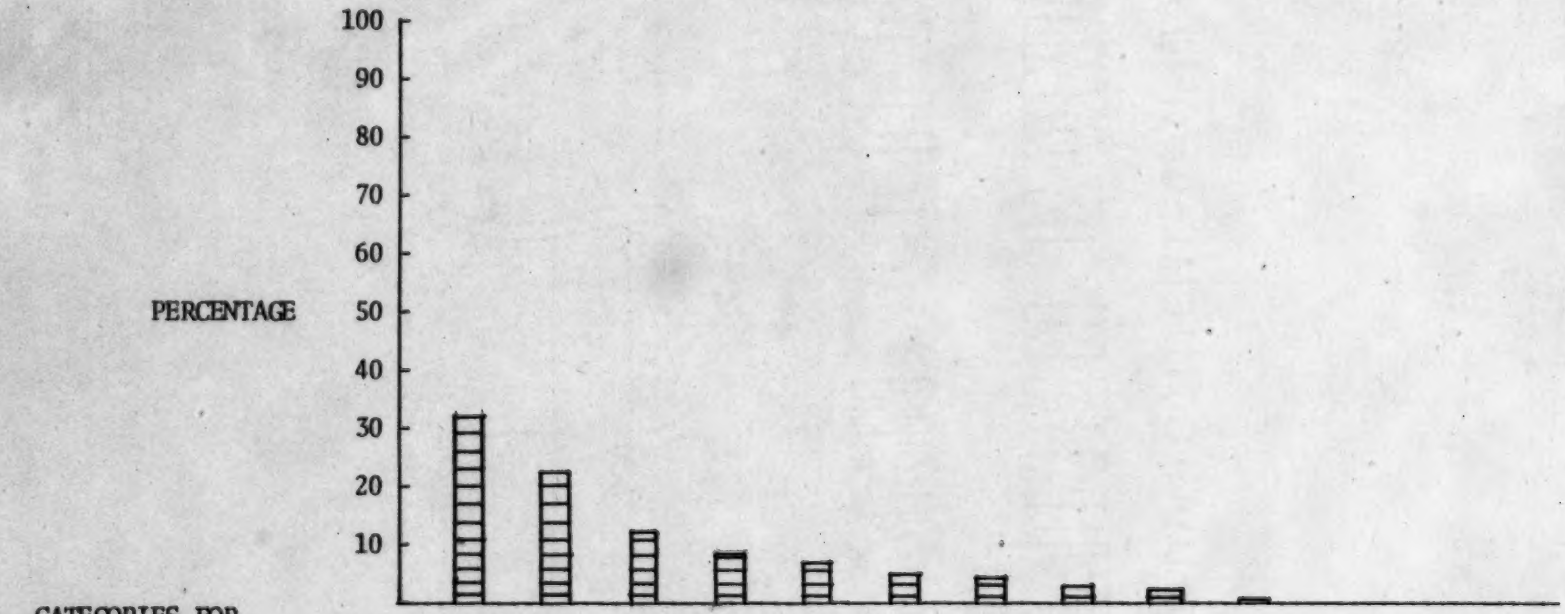
Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

FIGURE 9

COMBINED CATEGORIES FOR COMMUNICATIVE BEHAVIORS

FOUND IN MOTHERS

(COMBINED RESULTS FOR FIVE MOTHERS)



ten categories are treated separately. Individual percentage breakdown for the mothers for each time period was computed (Appendix K).

Mrs. Y. Nine types of communicative behaviors are gleaned from Mrs. Y's protocol, with the negative affective category missing. The three most frequently observed behaviors in her interaction involve the use of positive affect, mand, and tact categories (80.12%). The remaining 19.88% are distributed among six categories (Table 9).

Mrs. H. In Mrs. H's case both mand and positive affect are the first two most frequently used categories with the dominant control behavior as the third highest. These three categories comprise 53.97% of her observed behaviors with the remaining 46.03% distributed amongst the other seven categories. The negative affective category which is one of the seven categories appear in a negligible amount (Table 9).

Mrs. N. Surprisingly, the three communicative behaviors; positive affect, mand, and echoic categories, represent the majority of Mrs. N's interactions with Brett (70.96%). While the frequency count of the echoic category is low compared to the frequency count of all other categories, it is observed in Mrs. N's communicative repertoire more frequently than the other mothers. Like other mothers, the negative affect was negligible in Mrs. N's interaction (Table 9).

Mrs. Mc. In Mrs. Mc's case, an even distribution of 70.82% of her communicative behaviors amongst the positive affect, mand, and tact categories is noted. The remaining 29.18% are shared by the seven other categories. Again, the negative affect category represents less

than 1% of her total interaction with Erin (Table 9).

Mrs. L. While the combination of positive affect, mand, and tact is noted in all four mothers, Mrs. L's pattern is different. Instead of the tact, her third highest behavior is the dominant affective category. For her, use of the positive affect and mand was followed by the dominant affect which combine to represent 84.35% of her observed behaviors. Furthermore, only eight out of the ten categories for communicative behavior are found in her protocol. Both negative and submissive affect are missing (Table 9).

The Mothers' Communicative Behaviors Over Six Time Periods

General Results for Mothers

The fourth hypothesis for mothers center around affectional behaviors. It is expected that the mothers would spend a large portion of their time in affectional behaviors with their infants. A high frequency of positive affect is expected since feeding is hypothesized as a warm and positive situation for the infant. To answer this hypothesis the types of communicative behaviors in mothers over the six time periods observed are examined.

As anticipated, all mothers in the study use positive affective behaviors in interacting with their infants in the feeding situation. The high incidence of positive affect which is followed by the mand category is evident across observations. Tact is usually third highest, which combines with the two other categories to represent two-thirds of the mothers' total behaviors (Table 10, Figures 2-13).

However, in the first and fifth observations the tact is replaced

TABLE 10

COMBINED MOTHERS' COMMUNICATIVE BEHAVIORS RANKED FOR EACH TIME PERIOD

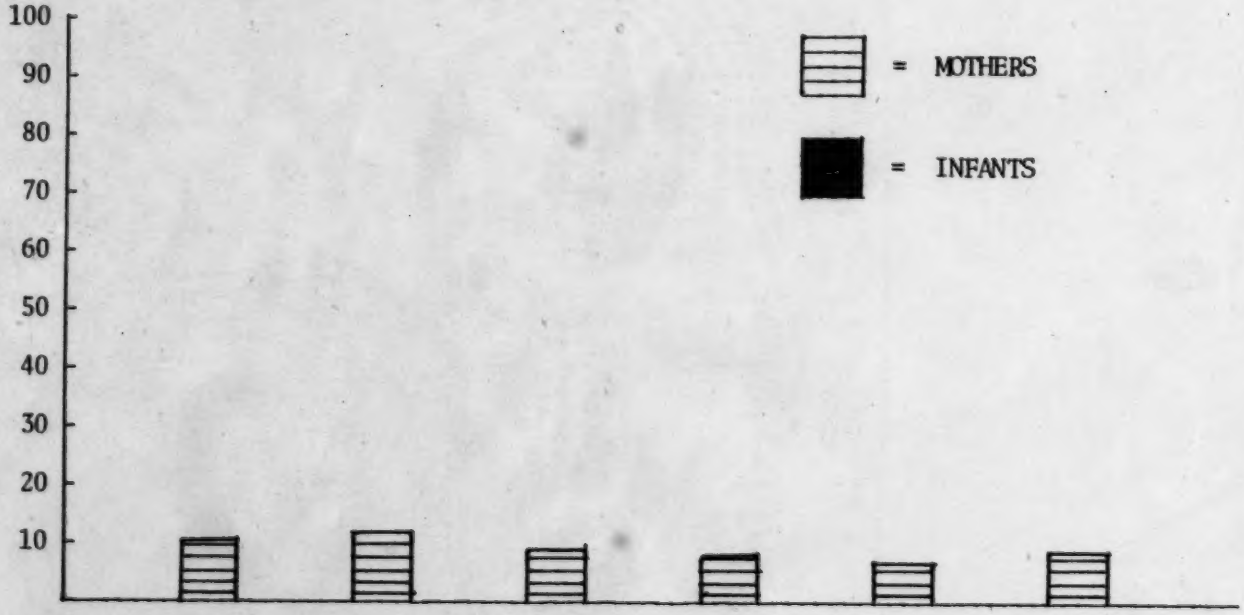
Rank	1ST OBSERVATION		2ND OBSERVATION		3RD OBSERVATION		4TH OBSERVATION		5TH OBSERVATION		6TH OBSERVATION	
	Category	%	Category	%	Category	%	Category	%	Category	%	Category	%
1	PA	35.33	PA	29.01	PA	31.18	PA	34.79	PA	30.99	PA	27.87
2	M	27.42	M	21.96	M	21.66	M	23.47	M	21.50	M	25.80
3	DA	10.85	T	15.90	T	14.71	T	12.20	E	13.33	T	16.81
4	E	7.02	DA	11.99	DA	9.45	DA	8.35	T	12.29	DA	8.86
5	T	6.86	E	6.54	ET	6.57	E	6.21	DA	7.26	E	6.34
6	ET	5.79	IV	5.97	IV	6.12	ET	5.59	ET	5.32	ET	4.31
7	IV	4.15	ET	4.82	E	5.92	IV	4.35	IV	4.00	SA	4.01
8	IA	1.57	IA	2.80	IA	3.15	SA	2.10	SA	2.86	IV	2.96
9	SA	0.62	SA	0.94	SA	1.13	IA	2.55	IA	2.17	IA	2.96
10	NA	0.39	NA	0.07	NA	0.11	NA	0.39	NA	0.28	NA	0.08

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

FIGURE 10

INFANTS AND MOTHERS PERCENTAGE OF DOMINANT AFFECT FROM THE FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATIONS

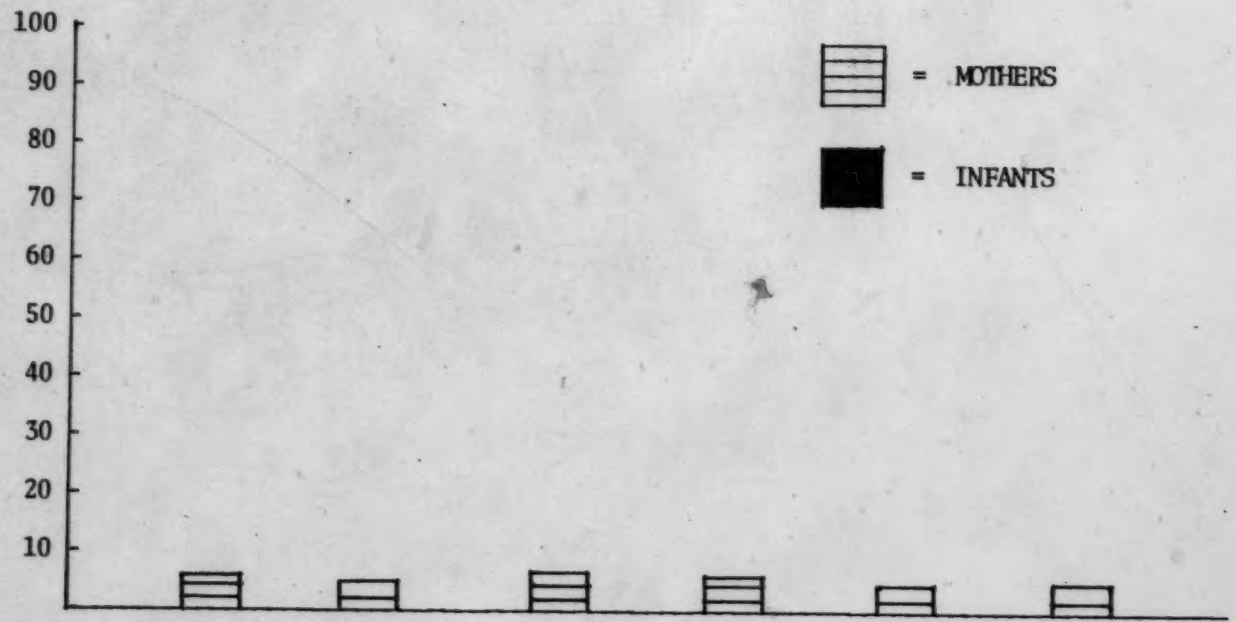
(COMBINED RESULTS ACROSS TIME PERIODS)



- OBSERVATIONS	1	2	3	4	5	6
- INFANTS' AGE IN WEEKS	2.6	4.5	6.7	8.9	10.8	13.1
- PERCENTAGE OF DOMINANT AFFECT IN:						
Infants	0	0	0	0	0	0
Mothers ($\bar{X}$ = 9.46)	10.85	11.99	9.45	8.35	7.26	8.86

FIGURE 11

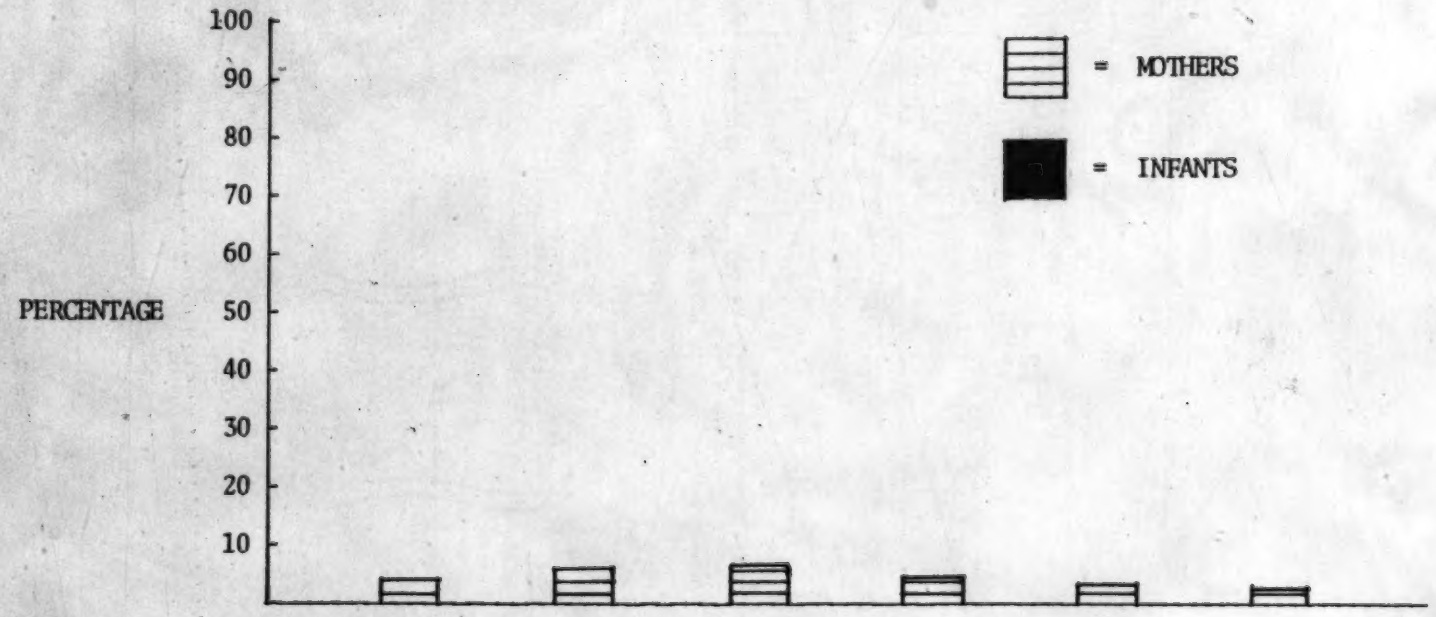
INFANTS AND MOTHERS PERCENTAGE OF EXTENDED TACTS FROM THE FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATIONS (COMBINED RESULTS ACROSS TIME PERIODS)



- OBSERVATIONS	1	2	3	4	5	6
- INFANTS' AGE IN WEEKS	2.6	4.5	6.7	8.9	10.8	13.1
- PERCENTAGE OF EXTENDED TACTS IN:						
Infants	0	0	0	0	0	0
Mothers ($\bar{X}$ = 5.4)	5.79	4.82	6.57	5.59	5.32	4.31

FIGURE 12

INFANTS AND MOTHERS PERCENTAGE OF INTRAVERBALS FROM THE FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATIONS (COMBINED RESULTS ACROSS TIME PERIODS)

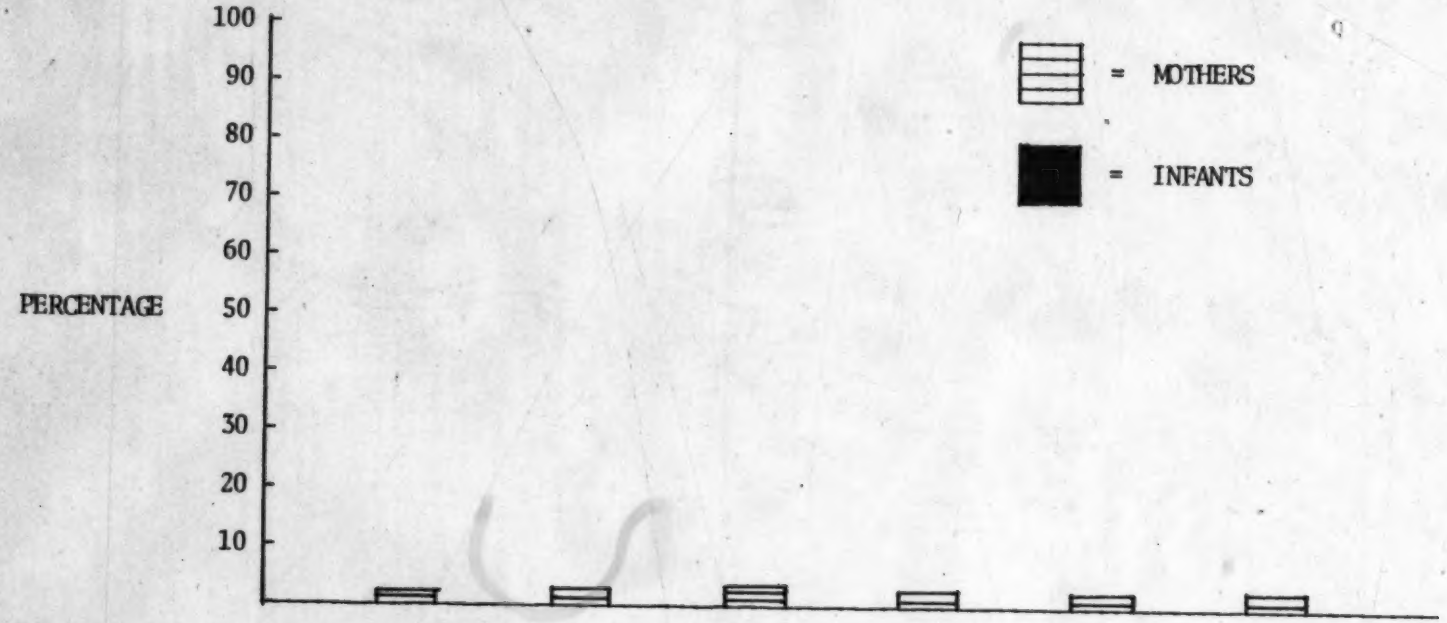


- OBSERVATIONS	1	2	3	4	5	6
- INFANTS' AGE IN WEEKS	2.6	4.5	6.7	8.9	10.8	13.1
- PERCENTAGE OF INTRAVERBALS IN:						
Infants	0	0	0	0	0	0
Mothers ($\bar{X}$ = 4.59)	4.16	5.97	6.12	4.35	4.00	2.96

FIGURE 13

INFANTS AND MOTHERS PERCENTAGE OF INFORMATIVE AUTOLITIC OPERANT FOR THE FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATIONS

(COMBINED RESULTS ACROSS TIME PERIODS)



- OBSERVATIONS	1	2	3	4	5	6
- INFANTS' AGE IN WEEKS	2.6	4.5	6.7	8.9	10.8	13.1
- PERCENTAGE OF INFORMATIVE AUTOLITIC CATEGORY IN:						
Infants	0	0	0	0	0	0
Mothers ($\bar{X}$ = 2.53)	1.57	2.8	3.15	2.55	2.17	2.96

by the dominant control and echoic categories respectively. Between the first and sixth observation the mothers' responses continue to maintain a varied profile with majority of the behaviors classified under three categories.

For all six observations the obtained percentage for the negative affect is consistently low. Of the remaining seven categories for communicative behaviors, four follow a pattern. The pattern involves frequency increases with the infants increase in age and these communicative behaviors are submissive control, extended tact, intraverbal, and information categories. For the remaining three categories of the mothers' interaction, no specific pattern across observations is discernable.

Individual Results for Mothers

While majority of the responses continue to revolve around the positive affective category, followed by the mand and tact categories, variability in individual mothers' use of communicative behaviors over six time periods is treated separately.

Mrs. Y. An analysis of Mrs. Y's responses shows that positive affect is consistently the most frequently used category across the six observations (Table 4). Positive affect is particularly high for the fifth observation. This is followed by mand and tact categories. In the third observation, however, this order is reversed. Tact placed second and mand third. While seven categories were present in all observations, the negative affective bheaviors were absent in Mrs. Y's interaction with James. The informative affect was only observed in

the second and sixth observations, while the submissive affect was observed in the first and sixth observations.

Mrs. H. Frequent and consistent use of the positive affective category across observations is shown in Mrs. H's protocol (Table 5). This was not the case for the first observation since mand placed first. Only the positive affective category appears to have a consistent pattern. While use of the mand and tact categories is also frequent, their positions as second or third highest is variable. The categories are mand, tact, dominant control, and intraverbal.

Mrs. N. With exception of the fourth observation Mrs. N's use of three categories is consistent across six observations. In order of their frequencies, these categories are positive affect, mand, and tact. In the fourth observation, tact was replaced by the echoic category. No specific pattern for the other types of behaviors is discernable (Table 6).

Mrs. Mc. Positive affective category was gain the most frequently used communicative behavior for the first, second, fourth and sixth observations. While positive affect, mand, and tact represent the majority of Mrs. Mc's interaction across observations, their positions varied. All seven categories which account for one-third of Mrs. Mc's behaviors do not manifest a particular pattern (Table 7).

Mrs. L. Of eight types of behaviors in Mrs. L's repertoire, the three most frequently observed categories in her interaction with Jennifer varied from other mothers. While positive affect and mand

generally occupied first and second positions across observations, the third most frequently observed behavior is the dominant control. A comparison of frequencies observed do not depict a specific pattern which relates to Mrs. L's use of the remaining six categories. These categories are tact, extended tact, echoic, intraverbal and information (Table 8).

CHAPTER V

DISCUSSION

Infant research of a longitudinal nature usually presents the researcher with formidable problems. This type of research involves sorting voluminous amounts of the data and making decisions on its relevance in the research context. Great demands are therefore made on the researcher's patience and persistence, as well as skill in retrieving the salient data for the study. In this study such data consist of nonverbal and verbal behavior that are on videotape and coded on the written transcripts.

The results are discussed in terms of four objectives, namely: (a) the range of infants' communicative behaviors; (b) the changes in infant communicative behaviors over six time periods; (c) the range of maternal communicative behaviors; and (d) the changes in maternal communicative behaviors over six time periods. For each of the four objectives a general as well as individual discussion of findings relating to the five infants and five mothers are presented. Limitations of the study are also presented.

The Range of Infants' Communicative Behaviors

General Discussion of Infants' Communicative Behaviors

As hypothesized, infants in this study demonstrated fewer types of communicative behaviors than their mothers. A less versatile behavioral profile consisting of the tact, positive and negative affect, mand, submissive control, and echoic categories characterize their interaction. These six language related behaviors are primarily of a nonverbal type. Some of the behaviors coded include crying, sucking,

and motor movements of the body and extremities (e.g., kicking, facial expressions, laughing, cooing, fussing, and other gestures).

As anticipated, the primary type of behavior known as tact emerged as the most frequently used category and represents two-thirds of the infants' interaction. This is consistent with the findings reported by Horner (1969), Marshall et al. (1973), and Gutmann et al. (1979). This result is not surprising since the tact category, which serves to maintain contact with one's environment, is regarded by Skinner (1957) as a primary operant. It enables the child to experience his immediate environment. Sensing the environment involves the infant's use of his "proprioceptive senses" (Gibson, 1966). Furthermore, while the nature of the tact responses observed is primarily nonverbal (e.g., sucking and staring at the camera), the process of engaging contact with one's surroundings is thought to allow the child to gain control of his immediate environment.

In Piaget's conception of infant development, the process of tacting or engaging contact with one's environment enables the infant in the senorimotor stage to experience the world through the process of assimilation and accommodation. On the basis of the infant's contact with objects and things in the environment, mental representations known as schemas are formed, the basis for further cognitive development (Lerner, 1976). It is therefore not so surprising that infants in this study spent most of their time in contact activities (e.g., looking at mother, and focusing on various objects in the room).

It was noted that the infant's use of nonverbal tacts encourages the mother to query what the infant is specifically looking at or

attending to (e.g., looking at objects). This preverbal communication between the child and the mother depends largely upon the mothers' understanding of the context of the infants' communicative behaviors. In assessing the infants situation the mother asks questions such as, "Are you looking at your mother? Are you staring at the camera?"

The production of both positive and negative affect, although nonverbal in nature, combine with the tact category to characterize the infants' interaction with their mothers. In this study the infants' positive affective behaviors consisted of smiles, coos, goos, laughs, and happy, contented umhum sounds in response to his/her mothers' talk, tickles, and other nonverbal behaviors. Some of the negative affective behaviors took the form of crying, fussing, scratching of face and ears with an expression of annoyance, and head turning away from the mother when she was talking to the infant.

The use of both positive and negative affective behaviors of a nonverbal type conforms with Argyle's (1975) suggestion that nonverbal communication, being more primitive than formalized speech, is direct and has a more powerful effect on interaction. In a developing young infant, one of the less refined and more direct method of communication appears to be crying.

Furthermore, Argyle (1975) and De Laguna (1940), the importance of nonverbal communication lies in the assumption that situations are not analyzed and cognized, and that communication is felt rather than cognized. While formal speech is analyzed and represents an interpretation of actual situations, it is organized, and therefore varied from person to person. Nonverbal communication especially in

an infant, being largely unanalyzed is more direct, and therefore not subject to as much interpretation as verbal communication.

From this it would appear that mothers in this study based their assessment of their infants' level of discomfort on the nature and intensity of their cry or cries. Mothers reported that they were not always sure why their infants cried, and finding the cause initially involved trial and error. It is interesting to note that mother's of autistic children who were interviewed by Schaeffer (1971) reported that their children never cried. These findings are markedly different from the infants' behaviors in this study. They cried vigorously when uncomfortable.

As expected, use of the mand, an operant which functions to change aspects of one's environment, as when one makes a request, was less frequently used compared to the tact, positive and negative affective categories. This suggests that the mand is possibly developed later than the tact, positive and negative affect. It also suggests that there is less necessity for manding among the infant subject's first three months of life. It may be that due to the inordinate amount of time and attention infants receive from their mothers and members of the household, he/she does not need to request or ask for attention.

Since the needs of infants in this study appear to have been anticipated by their mothers and possibly also met by their mothers, the infants did not necessarily need to mand. The following situation is an example. The mother asks the infant questions that the infant is obviously unable to respond to verbally. "Are you still hungry? Are you? Yes, you are!" The mother, however, relies on her infants'

nonverbal cues to arrive at the decision that the infant is still hungry. Her ability to assess her infants' requirements, therefore, plays an important role in meeting his/her needs.

Like the mand, the submissive control category, which indicates compliance or acceptance, obtained a low frequency count with infants in this study. It seems that the infants' consistent activity level when awake, makes it difficult for them to submit to their mothers' control. Tiredness and a quiescent state on the infants part were the only situations which appear to have encouraged the emergence of this type of communicative behavior.

While present results on the mand, tact, and echoic categories can readily be related to the more recent studies using a functional analysis of behavior, most categories in the present modified coding system have no precedent in early infancy research known to the writer. A comparative discussion on the submissive control category found in infants is, therefore, not feasible at this time.

The echoic category, thought to be important in learning by way of imitation, was not particularly evident with the exception of two of the infants. The echoic category appeared in Brett N and Eric Mc's interaction with Mrs. N and Mrs. Mc respectively.

In these observations it was noted that Mrs. N and Mrs. Mc engaged their infants in a playful situation. Instead of feeding or burping them, some form of playful interaction that did not involve feeding was engaged in by the mothers. Tickling, and talking intently with the infants are some of the situations other than feeding that elicited echoic behaviors. This would suggest that while there are different

types of interaction in a feeding situation, feeding combined with a playful situation that allows for the mother-infant pair to conduct a conversation or dialogue appears to enhance and encourage the production of imitation, or an echoic category in the infant.

Since the nature of feeding would also appear to curtail the production of echoics and perhaps other types of communicative behaviors, it is important to examine further the implications of a playful situation as opposed to a strictly feeding situation in the production of echoics, or imitation.

In Horner's study (1969) the echoic operant was also fairly limited. This would appear to reinforce the notion that production of echoics requires a specific, possibly playful and relaxed setting. It is also possible that learning by imitation does not necessarily happen within a short span of time. Since the echoic category is used only when imitation occurs within approximately one to three minutes, some aspects of imitation may not have been readily coded under the echoic operant.

The immediate repetition of behavior, called for in coding an echoic category, may not enhance our present information on the imitative process, a step regarded with importance in learning. Therefore, it is possible that the finer aspects, and the nature of the imitative process may not have been incorporated in the present coding system.

As Meltzoff and Moore (1977) have shown, infants' imitative competencies by way of facial and manual gestures can be observed as early as 21 days. They, however, point out possible methodological difficulties which relate directly to the distinction of true imitation

from a global arousal response. Perhaps the question as to who is doing the imitation should be posed. Is it the mother or the child? Is the adult imitating a general repertoire of reflex activities an infant is in fact inclined to already have?

Individual Discussion of Infants' Communicative Behaviors

While the tact, positive and negative affect, mand, submissive control, and echoic categories of a nonverbal nature were identified for the infants in this study, individual variation was also evident.

James Y. Five types of communicative behaviors were found in James' interaction with Mrs. Y. They are mand, positive and negative affect, submissive control, and mand categories. The majority of James' observed nonverbal behaviors are classified under the tact category. This is to be expected since James fed continually and sucked vigorously. He also seemed hungrier than other infants. This may have been due to the fact that almost all observations took place between 4:00 to 4:30 in the afternoon after James' long afternoon nap, and four hours from the previous feeding session.

The absence of playful situations during the observations appears to account for the absence of any echoic behaviors in James' interaction. This reinforces the notion that feeding alone limits the production of imitation, and possibly other types of communicative behaviors.

Christopher H. All five categories for communicative behaviors which includes tact, positive and negative affect, submissive control,

and mand, were found in Christopher's interaction. Both the tact and negative affect characterize most of his interaction.

While the high frequency of the tact category conforms with the overall results, the relatively high frequency of negative affect is unlike most of the other infants' profile. This appears to be due to Christopher's frequent crying spells during the observed feeding sessions. By the fourth observation Mrs. H discovered that Christopher frequently cried since he did not get enough milk from the breast. When breast feeding was supplemented by bottles of milk, he did not cry as much. Christopher was also prone to being colicky, a situation which appears to have contributed in the frequent production of negative affective behaviors.

Given Christopher's physical problems, which caused him to cry more frequently than the other infants, it is understandable why the echoic category was not found in his interaction during these observations.

Brett N. While all six categories for communicative behaviors were found in Brett's repertoire, three categories defined his interaction. They are tact, positive and negative affect. Frequent use of three categories, rather than one or two, suggests more variability in Brett's observed interaction. Variable use of the other types of nonverbal behavior is also suggested in Brett's profile. This is possibly due to the different moods and situations which were observed by the writer when videotaping the sessions.

Before and after each of the observations the writer noted that Brett was often involved interacting with his sister, father, or

visitors. Therefore, the feeding situation for Brett and Mrs. N also involved play periods and talking sessions in between feeds. The echoic behaviors produced by Brett involved approximating Mrs. N's vocalizations (e.g., a goo sound). No self-repeating echoics were coded.

Since Mrs. N was also conducting her own research project on Brett's vocalization, it is possible that compared to the other mothers in the study, she was much more inclined to encourage Brett to vocalize and imitate, thus facilitating the production of other repeating echoics. She seemed unusually sensitive and aware of Brett's vocalization. Earlier in the study she indicated to the writer that she wished she had a tape recorder during Brett's delivery, since he vocalized a specific vowel instead of producing the expected first cry.

Erin Mc. Like Brett N, Erin Mc's profile shows all of the six types of communicative behaviors. Similarly a combination of tact, positive affect, and mand characterize most of her interaction. It is interesting to note that both infants engaged in a variety of activities other than feeding during the observations. This was not always the case for the other infants observed.

The self-repeating echoic behaviors were observed during the second observation, when Mrs. Mc was talking to Erin, and repeatedly asking her if she wanted to hold hands with mother. The echoic behavior consisted of ah sounds which Erin produced and repeated in response to Mrs. Mc's questions.

The data from both Erin Mc and Brett N would, therefore, suggest that varied activities which includes talking and playing in between

feeding, enhances the production of varied types of communicative behaviors including the echoic category.

Jennifer L. The majority of Jennifer's interaction was coded under the tact category. This is not surprising since Jennifer seemed almost always engrossed with the feeding process. Since she was either sucking, or sleeping, it is understandable that she obtained an unusually high tact frequency count. This appears to account for the sole use of the tact category and the exclusion of all other communicative behaviors during the first three observations.

Two variables may have contributed to these findings. The first variable is time; observations conducted between 8:00 and 8:30 in the evening when Jennifer seemed to just want to fall asleep in between feeding. The second variable pertains to Jennifer's birth by Ceasarean section which may have contributed to her seeming need for more sleep periods during the observations, compared to the other infants.

The Infants' Communicative Behaviors Over Six Time Periods

General Discussion of Infants' Communicative Behaviors

With exception of the echoic and submissive control categories, all types of communicative behaviors were observed in six time periods. These results are based on the combined infants' data. The findings suggest that the echoic category is developed later in the infants' lives. When the infants were completely absorbed in sucking, possible interchanges and dialogue between the mother and child pair were temporarily excluded (e.g., talking or playing). While the infants may

possibly have been equipped with the predisposition for an echoic behavior, it is possible that the mothers were not taking advantage of it, at least during the observations.

The small frequency of echoic behaviors in two infants, and its complete absence in three infants observed interaction conforms with the relatively few echoics found by Horner (1969) among 3 year olds. These findings are similar to those reported by Rondal (1978) and Gutmann et al. (1979). They found that non-retarded children produced more echoics than their retarded counterparts. The echoics found in the second time period belong to Erin Mc, while the echoics observed the fifth and sixth time periods belong to Brett N.

The absence of the submissive control category in the second observation suggests that a situation requiring the infants' compliance did not emerge for all subjects.

The Six Categories for Communicative Behaviors Found in Infants

Tact. The tact category which serves to maintain contact with one's environment did not only predominate in the infants' interaction, but it showed an appreciable decrease in frequency over six time periods. This held true when all infants' data were combined. A frequency decrease in the tact category, however, indicates that as the infants were older, they also evolved a type of interaction that allowed for the use of the other types of communicative behaviors, thus gradually moving away from the tact responses.

While the infants' gazing behaviors have been studied (Robson, 1968; Stern, 1971; Jafee et al., 1973; Fraiberg, 1974; and Stern et al.,

1975), the evolution of gazing behavior as a nonverbal tact (e.g., looking intently at mother's face or camera), to the pointing stage, and eventually to the naming of objects (a type of verbal tact), is one aspect of early development that is not well documented. Gleason (1977) has also pointed this out.

The mothers in this study did not only anticipate their infants' needs but frequently queried their infants whenever they seemed to look at any object in the room. The following questions are some examples. What's that? What's that? Are you looking at the pattern in mom's dress?

The Negative and Positive Affect. The negative affect as manifested in the infants' cries and squeals; and the positive affect as expressed in smiles, coos, and happy synchronized sounds, was evident across time periods. This is to be expected since crying appears to be the infants' most direct and effective means of communicating with their mothers. The infants' cry appeared particularly aversive to his/her mother. Because of this, mothers seemed compelled to discover the reasons for the infants cry, and act upon it to calm him/her down, and eventually stop him/her from crying.

Positive affective behaviors were also consistently found throughout the six observations. This indicates the infants' capability in expressing not only negative affective behaviors, but positive affective behaviors as well all at a very early age. For example, smiling appeared so reinforcing for the mothers that they tried to encourage their infants to smile again and again.

The Mand and Submissive Control Categories. While an examination

of Figure 6 suggests that the mand category was found across six time periods, all of the mands observed for period one belonged to Christopher H. Since Christopher H was older than most other infants, except Erin Mc, at the first observation, it is possible that the mand is also learned later. It is possible that the constant and undivided attention the infants received from their mothers and other family members during the first three weeks of life, made manding unnecessary, since their needs appeared to have been anticipated and met.

The submissive category also found across observations, except the second, suggests that the infants were gradually falling in line with their mothers' requests or demands for compliance. In a society governed by law and order, compliance is valued.

The Echoic. As mentioned earlier, the echoic category which consists of self-imitation or imitation of others, was found in only the second, fifth, and sixth observations, and was produced by only two of the infants. They are Erin Mc and Brett N. The focus of feeding itself and lack of playful situations in between feeds appears to account for the small and inconsistent pattern of the echoic category.

Individual Discussion of Infants' Communicative Behaviors Over Six Time Periods

Individual examination of the infants' data across time periods suggest subject variability of findings.

James Y. Only the tact category appears to be relatively high with a steady pattern of decreasing frequency counts across time periods. James' results conform with the general pattern for the

combined infants' data. All throughout the six observations the other four categories for communicative behavior showed no fixed pattern. This implies that while there are varying types of communicative behaviors in James' repertoire, they were not frequently used during the second week of life. Furthermore, it would appear that situations dictate when a type of behavior may be useful or appropriate (e.g., mand).

Christopher H. Similarly, Christopher H's use of the tact category decreased as he was older. By the sixth observation only 5% of his interaction was coded under tact. An abrupt increase in the negative affective behavior was however most noticeable. The unusually high frequency count was due to the fact that Christopher spent most of the sixth observation crying. This was the first observation conducted following Mrs. H's return to work.

Christopher's use of the mand dates back to the first observation when he was 3 weeks old. While Erin Mc was also 3 weeks old during the first observation, the mand was not observed in her interaction until the second observation. The absence of the mand category during the first or second observations on other infants, and its presence in Christopher's first observation is not readily explainable.

It may be that Christopher had unmet needs, such as inadequate amount of milk intake from the breast, which placed him in a position of needing more milk, thus the use of the mand category.

Brett N. Consistent use of the tact, positive affect, and negative affect across six time periods is evident in Brett N's observed

interaction. The frequency of the tact category did not decrease as Brett was older, but remained relatively high. This means that Brett's interaction is not consistent with three other infants in the study. In all observations the frequency distribution was generally shared by the tact, positive and negative affect, while most infants employed tact in their interaction.

The cause for Brett's different interaction pattern is not readily explainable without a larger sample to compare his behaviors with. This type of comparative analysis is, however, beyond the scope of the present study.

Brett's echoic behaviors which were found only in the fifth and sixth observations, reinforces an earlier suggestion that the emergence of the echoic is based upon a more playful and relaxed setting, with the mother definitely taking an active role in specifically encouraging the infants to imitate sounds, and to vocalize.

Erin Mc. Both Erin Mc and Brett N showed a similar pattern in the use of tact, positive and negative affect. High frequencies of these categories across observations was noted. It indicates that both dyads have a similar style of interaction. It is interesting to note that Mrs. N and Mrs. Mc are friends, and both are interested in infant speech. Mrs. Mc, like Mrs N were involved in one other research project with their infants.

Erin produced echoic behaviors only in the second observation. Her echoic behaviors were of a self-repeating type, which means that they were not directly elicited by Mrs. Mc. Since the echoic was not

observed again in Erin's interaction, it is possible that the conditions necessary for their production were not repeated.

Jennifer L. Sole use of the tact category is gleaned from Jennifer's observed interaction with Mrs. L. This pattern changed after the third observation, with the addition of the negative affect, submissive control, and mand categories. Jennifer's interaction pattern began to resemble that of the other infants. During the first three observations Jennifer's activities consisted mainly of feeding and sleeping. As mentioned earlier, Jennifer's initial and less versatile use of the communicative categories may have been caused by two possible factors; the late observations conducted between 8:00 to 8:30 in the evening, and her birth by Ceasarean section.

Mothers' Range of Communicative Behaviors

General Discussion of Mothers' Communicative Behaviors

As expected, mothers in this study presented a more varied communication profile compared to their infants. Their interaction is characterized by the frequent use of positive affect, mand, tact categories, and neglibible amounts of negative affective behaviors. These results lend support to Oddie's findings (1976), and McLeish's report (1978), that effective teachers compared with noneffective teachers show a more variable communicative profile, use more mands, tact, and some positive affective categories. This would also imply that mothers in this study took on a teaching role towards their infants even at 2 weeks old!

Positive Affective Behaviors. In the context of this study, some

examples of the mothers' nonverbal positive affective behaviors consisted of kissing, hugging, cuddling, rocking, affectionate touching and stroking, smiles, laughs, tickling, whispers, adoring and affectionate looks at the infant. Positive affective verbal behaviors included some of the following sentenc examples: That's a good boy!; Atta girl!; That's sweet.; Hi sweetheart!; and Hellow!

It is interesting to note that for all ifve mothers most of the observed behaviors coded under the positive affective category were in the nonverbal rather than the verbal form. This suggests that mothers were matching their infants' nonverbal mode of interaction by frequently using nonverbal positive affective behaviors. This observation supports Stern et al.'s (1975) findings that positive emotions are used by mothers to maintain an ongoing relationship by arousing interaction.

Furthermore, it is possible that the mothers' nonverbal positive affective behaviors encouraged the establishment of nonverbal repertoire between the mother and child pair.

Compared to a formal teaching situation, one essential difference that stands out in the mother and child interaction is the preponderance of positive affective behaviors. Use of this category by the mothers was not only frequent, but its occurrence also predictable. The positive affective behaviors followed nearly every other category observed and coded for mothers. This was expected since the feeding situation was thought to be a warm situation for the infant. These findings confirm Clarke-Stewart's (1973) results indicating the importance of positive affective behaviors in stimulating children's intellectual development.

The effective teachers is thought to achieve both effective

interaction where effective interaction is a matter of accurage tacts, extended tacts, a proportion of dominant control, and some positive affect. Support and approval synonymous with the function of the positive affective category is thought to facilitate effective interaction (McLeish, 1978).

While the role of the mother is essentially that of a teacher, she does this in an unobtrusive and spontaneous manner. Thus, fundamental differences exist between direct classroom teaching and a feeding situation where a relatively helpless infant is involved. It seems to the writer that the nuturing role of the mother in a feeding situation, encouraged by the infants' need for help, facilitate the appearance and relatively high incidence of positive affective behaviors.

Although this situation is essentially informal, the laws that govern learning appears to be operative. It has been observed that the mothers selectively reinforce their infants' behaviors, including the sounds the infant produced by strong positive affective behaviors, and in turn the mothers are rewarded on a long term basis by the community for ensuring that values are transmitted to the child. It has been established impirically that in the case of language acquisition, a German baby learns the sound of the German language long before formal language acquisition is noticeable. Similarly, a French baby starts with the rudiments of the French language with an accent which most adult non-French speakers have difficulty imitating.

As infants are unable to verbalize their needs, the mother must continually assess and interpret the infant's state and act on his needs in a concerned and affectionate manner. The mother, therefore,

not only acts for herself but for her infant as well. This dual role, peculiar to mothers and their infants, was also reported by the Nottingham University group. This funtion, which most mothers appear to fulfill, has been designed by Newson and Shotter (1974) as that of being a "double agent."

Mand and Tact. As expected the mand, whose essential function is readily captured by the words command and demand (Skinner, 1957), was consistently and frequently used by mothers. This is in line with Marshall et al.'s (1973) findings among non-retarded children, and also conforms with Ervin Tripp and Miller (1963), and Garvery's (1977) suggestion that mothers used requests and interrogatives to facilitate interaction with early language learning children.

Both verbal and nonverbal mands were used by the mothers in this study. Some nonverbal mands involved sitting the infant in an upright position and patting the infant's back to ensure that he burped; ensuring that the nipple was in the infant's mouth so feeding could commence. Surprisingly, most behaviors coded under the mand category were nonverbal in nature. The following are some examples: Did you loose it?; What's the matter?; What are you doing?; What's the trouble?; Just calm down.; Do you wantta burp?; What's upsetting you?; Shall we have a hot bath?; Where's your Dad?; Open up.; Come on.; and Are you hungry?

An examination of the mothers' interaction suggests that the mands were used to mainly assess the infants' situation. While the infants were obviously unable to verbally answer the questions, the mothers answered their own questions using the infants' nonverbal cues. When

the infants continued to fuss even after feeding, their mothers tried to find out if they were still hungry.

The importance of mands in a teaching situation cannot be over stressed. By asking questions, which primarily work for the benefit of the speaker, information is obtained which is useful in making any type of assessment, whether it pertains to a person or situation. In the feeding situation the mother appears to be constantly checking whether she is doing the appropriate thing for her infant. She assesses his/her need, on the basis of his/her nonverbal messages, and acts on them.

Horner (1968) suggested that maternal mands are important since the child's survival is in jeopardy unless his behavior comes under the effective control of his most intimate contact, his mother or caretakers.

The tact category, synonymous with the word tacticle and functionally understood as an individual's contact with one's environment (Skinner, 1957), was the third most frequently used category among mothers. Nonverbal tacts for mothers consisted of holding the infant's hair, wiping his/her mouth, arranging his/her clothing or bottle, feeling the infant's bottom, looking at the feeding bottle. Some examples of verbal tacts are as follows: All broke off.; Your fingernail is coming off.; and Your pants are really wet.

Most of the tact used by mothers were nonverbal in nature and also appears to be mostly related to child caring functions (e.g., ensuring the infant was not wet, that the bottle was reasonably warm).

The present findings showing high tact frequencies are similar to the results reported by Horner (1968) in her study of 3 year olds.

Dominant Control Category. The dominant control category which

functions to draw attention to the speaker or person about to speak (McLeish, 1978), represents less than 10% of the mothers' communicative behaviors. Some of the dominant control behaviors used by mothers to draw their infants' attention include words like: well, son, hey, oh! my goodness; and sounds like: um, eh, hay, yeh, uh uh, and tsk tsk. These words and sounds were often used to capture the infant's attention.

It would appear that the mothers used this to call and also retain their infants' attention to what she was doing or saying at the time. In cases where the infants' attention appeared to be wavering, the mothers said, "hey!" to ensure the infants attention was focused on her again.

Echoic. The echoic category which essentially involves imitation represents less than 8% of the mothers' communicative behaviors. Most of the echoic behaviors used by mothers were of a self-repeating type. This means that mothers repeated what they said to their infants (e.g., What's that? What's that?, You're funny. You're funny., You've got your eyes open. You've got your eyes open, and Like that peppermint taste? Like that peppermint taste?).

While self-repetition may appear to have no immediate and discernable function in the feeding situation, the use of self-repetition by the mothers appears useful in clarifying and confirming their infants' level of comfort, discomfort, and possible comprehension. While a verbal reply was not obviously forthcoming from the infant, the mothers' patience and persistence in repeating questions may be based on an underlying assumption and expectation that by repetition, a nonverbal reply will eventually result from the mother to act on.

The echoic What's there, What's there, encourages a response. Whether the infant is responding to the general sound of the mother's voice or the mother's way of turning his head into one direction, the shaping process of a spontaneous nature is taking place.

As Brazelton (1974) also observed, mothers tend to endow the smallest behavior of neonates as a very significant communication.

Extended Tact and Intraverbal. Extended tact, which serves to extend and enlarge contact represents less than 5% of the mothers' total interaction. Some of the extended tact observed in mothers are as follows: You're still hungry.; Just like a big pig.; That's going to feel so good in your tummy.; You're just about full.; You really were hungry.; I just didn't get enough food.; and Such a little glutton.

Similarly the intraverbal category represents less than 5% of the mothers' total responses. The intraverbal is similar to an echoic except that instead of a point-to-point correspondence, thematic correspondence is necessary. It serves to extend sense. A mother saying, "I want the rest of my dinner" on behalf of her infant who is feeling uncomfortable because feeding was prematurely terminated, is an example of an intraverbal.

Use of the extended tact and intraverbal categories among mothers and infants is difficult to interpret in this study since no specific pattern in their individual use is apparent. Research studies with which to compare the present data is also limited to older children and their mothers.

Information, Submissive Control and Negative Affective Categories. The informative category which essentially serves to communicate

information without any discernable show of emotions or feelings is difficult to imagine in the mother and child pair, in the feeding situation. Less than 3% of the mothers' combined interaction fall under this category. Use of the information category was usually tagged onto other categories. The following serve as examples: I think (informative category) you are still hungry (extended tact). It's going to be (informative category) a nice day tomorrow (extended tact). I don't know (informative category) if you are asleep or awake (extended tact).

Submissive control category as shown by compliance seems to provide a precondition for communicative behaviors (McLeish, 1978). Situations that cause the mother to submit to the infants' moods were coded under the submissive category. The following is an example. One of the infants persistently refused to take the bottle when he was being weaned from the breast. After his mother tried to feed him several times she gave in and took the bottle away from his mouth.

The negative affective behaviors represent less than 1% of the mothers' communicative behaviors. Some examples include the following. Saying no, or whooa, in response to the infant's persistent and irritating cry where no sign of stopping seems evident.

Information, submissive control, and negative affective categories in mother and infant interaction require more exploratory work since the lack of any pattern among these specific categories in the present study do not lend itself to any further explanation other than what has been provided earlier.

Individual Discussion of Mothers' Communicative Behaviors

Individual examination of the five mothers' data suggests the consistent use of the positive affect, mand, and tact categories and the varied use of other communicative behaviors. Positive affect and mand represented more than half of their interaction. In general, the mothers used the communicative categories in a similar way with some minor variations. These variations are discussed individually.

Mrs. Y. The observed behavior in Mrs. Y's interaction conforms with the general pattern as reported and discussed earlier.

Mrs. H. Instead of the positive affect occupying the first position, the mand obtained the highest frequency count in Mrs. H's interaction with Christopher. By taking into account Christopher's crying behavior, Mrs. H's deviation from the pattern shown by other mothers is understandable. She had to quieten Christopher down, and therefore to do this she used several mands to try to minimize his cries.

Mrs. Mc. Mrs. Mc's general profile resembles the results for all mothers' data combined, as well as Mrs. Y's profile. While her daughter Erin also produced some echoic behaviors, no discernable pattern in Mrs. Mc's interaction appears to have contributed to its production except her constant talk and dialogue with Erin during and in between feeding.

Mrs. L. Both submissive category and negative categories were absent in Mrs. L's profile. This is not easily explained but it is

possible that since Jennifer was such a quiet baby, these categories may have been unnecessary at the time the observations were taken. The relatively low percentage of tact used by Mrs. L may also be due to Jennifer's less active state during the observations.

Mothers' Communicative Behaviors Over Six Time Periods

General Discussion of Mothers' Behaviors

As expected, a high proportion of positive affective behavior was found among mothers for all six observations. The consistent production of positive affective behaviors suggest that feeding is a warm situation for the infant.

Both general results and results for each of the observations suggests that mothers maintained frequent use of positive affect and mands to relate with their infants. This means that while the mother shapes the infant's behaviors by her requests and demands for certain types of behaviors (e.g., sucking when the nipple is placed in his mouth, burping when the mother pats his back) she does this in an affectionate and positive manner.

Use of the other categories do not necessarily show any pattern across observations, but all of the categories were consistently used in small proportions. As discussed earlier, the distribution of the mothers' communicative behaviors is similar to that of the effective teacher reported by Oddie (1976), with exception of the unusually high frequency of the positive affective behaviors.

Individual Discussion of Mother's Behavior

While the positive affect and tact consistently and respectively represent one-third, and one-fourth of all mothers' interaction, some variability in their interaction is presented.

Mrs. Y. Mrs. Y's interaction followed the general pattern of high positive affect, mand, and tact as discussed previously. The inconsistent appearance of both information and submissive category is not readily explainable except that these categories were perhaps not functional for Mrs. Y at the time they were not used.

Mrs. H. With exception of the first observation, Mrs. H's profile was similar to the general results previously discussed. The unusually high frequency of the mand category during the first observation was due to Christopher's crying spells, again explained earlier.

Mrs. N. and Mrs. Mc. Both mothers' results showed a similar high frequency of positive affect, mand, and tact categories, with the exception of Mrs. N's high production of echoics thought to have caused Brett's production of echoics.

Mrs. L. In Mrs. L's case, while a high percentage of positive affect and mand was the pattern, the dominant control category occupied third position rather the mand. Mrs. L's more frequent use of the dominant control category may have been due to Jennifer's frequent quiescent and sleepy state. Mrs. L may, therefore, have felt the need to call and maintain her attention especially during the observations.

Limitations of the Present Study

In applying the Skinnerian operants to code behaviors, clear visual and acoustic information is important. This was not always possible since only one camera was used. A four-way camera permanently set up in one place would have facilitated the coding of behaviors.

The use of borrowed VTR equipment posed several problems. While these problems were minimized following the pilot study conducted by the writer, one observation was not coded since the tape was inaudible. Altogether, two observations out of 30 involving two separate dyads are missing on account of weather related problems.

Subjects who participated in the research were generally of middle class backgrounds, thus invariably limited the generalizability of the present findings. Also, while the study is generally exploratory in nature, the small sample used further limits the generalizability of the results.

The coding system employed in this study has only previously been used with adult groups, and not with mother-infant dyads as used in this study. Changes in the operant examples are therefore limited to the behaviors emitted by the subjects of the present study.

Although mothers in the study have had previous experience of being videotaped, and seemed to have readily adapted to the electronic equipment, the camera, especially when visible, remains an obtrusive variable in the mother-infant interaction during feeding. It questions the validity of how nature is a naturalistic observation of this kind.

The time variability in the human neonates alertness and wakefulness during the first few days of life represents a major

difficulty in infant research studies, particularly in the interaction domain. While analysis of the present study was designed with this problem in mind, some of the infants' invariably slept during parts of the observation. This generally happened during the first three observations when infants were between 2 to 6 weeks old. McFarlane (1977) suggested that infants are alert in between feeds, although this did not appear to hold true for the newborn infants in this study.

CHAPTER VI

SUMMARY AND IMPLICATIONS

Summary

The primary objective of the naturalistic and longitudinal study reported here was to describe the nature and changes of mother-infant communication in the feeding situation.

The subjects were five mothers and their newborn infants. Twenty-eight 15-minute videotaped observations were collected over a period of three months from the time the infants were 2 weeks and 6 days old to the time when they were 13 weeks and 1 day old. To examine dyadic interaction, a modified Skinnerian functional analysis of communicative behavior was applied to all observations.

As predicted, the infants showed a narrower range of communicative behaviors compared to their mothers. Out of ten categories for communicative behaviors only six were found in the infants' nonverbal repertoire. In order of their frequencies, from the highest to the lowest, they are tact, positive affect, negative affect, submissive control, mand, and echoic categories.

While tact represented majority of the infants' interaction, a combination of the tact, positive and negative affective behaviors characterized their interaction. While the mand appeared to be developed later, the echoic appears to manifest itself in relaxed and playful settings when actual imitation was actively being elicited by the infant's mother. The tact showed a gradual decrease in frequency as the infants were older.

All of the categories for communicative behaviors were found in

the mothers' interaction. They were in both nonverbal and verbal forms. In order of their frequencies, they are positive affect, mand, tact, dominant control, echoic, extended tact, intraverbal, information, submissive control, and negative affective categories.

With the mothers in this study, positive affective behaviors dominated their interaction. This result was also expected. A combination of positive affect, mand, and tact, with small frequencies of the seven other types of communicative behaviors typify the mothers' interaction with their infants in the feeding situation. This pattern was consistent across six time periods observed.

While the generalizability of the present findings is limited, the study has outlined the basic pattern of early nonverbal communication of five mother-infant pairs in the feeding situation. The study has also reinforced the importance of examining the early phase of nonverbal communication, thought to be crucial in the acquisition of language. Although results reported here fall within the framework of the theoretical rationale presented, expansion of this study to cover the neonatal period prior to 2 weeks old and beyond the three month period is recommended to obtain a comprehensive view of actual speech and language development. An examination of the qualitative changes in early mother-infant interaction may also provide a better understanding of the nature of language development.

It is perhaps important to mention that the Skinnerian functional analysis of behavior is also applicable in early mother and child interaction.

Theoretical Implications

The importance of social interaction in the development of speech and language is usually brought to our attention only when isolation and deprivation from meaningful social interaction results in the absence of formal language, as in the Wild Boy of Aveyron. While accepting the fact that language is a many faceted study, it is crucial that a more integrative approach which cuts across disciplines be taken in designing language research. It seems to the writer that attempts ought to be made to integrate the superficially imposed dichotomies between the fields of Linguistics, Anthropology, and Psychology, and thus relate communication under the rubric of social interaction and the development of formalized speech. Use of two or more coding systems for organizing language study may be utilized to pursue this integrative approach.

While this study has centered on early interaction, its primary thrust has been to establish a working framework for future research in an attempt to bridge the gap between formal speech and social interaction, assuming of course that interaction forms the basis for social organization.

The working model presented here appears adequate and the initial results support the predictions, however, more research information is required to adequately assess the entire model, especially when extended to include language development when the child is of school age. Consequently, both cross sectional researches and longitudinal studies should attempt to collate information on how the different types of communicative behaviors change from its preverbal form to

formalized speech, utilizing a functional analysis of behavior.

Research Implications

Research questions should be formulated to investigate the period when the other operant changes from the preverbal to the verbal mode. In the case of the echoic category, some questions remain unanswered. In what type of situation does this type of behavior usually manifest itself in the mother and child interaction? From a clinical standpoint, how are pathological echoic behaviors such as in echolalia and echopraxia developed? Since echolalia and echopraxia involves a disturbance of conation, a lack of capacity of imitate action (Louis, 1975), is it possible that inadequate control of one's environment also stems from inadequate development and inappropriate use of the tact and mand categories? Similar questions could be posed and tested experimentally using the other types of communicative behaviors employed in this study.

Results presented in this study also supports the importance of imitation in language acquisition. A closer look at the echoic operant, its composition, and how it relates to imitation is indicated. More importantly, how does the mother or caretaker develop and take advantage of it?

In applying this model, several research questions of interest to the developmental psychologist may be examined. How does Piaget's (1955) formulation of egocentric and socialized speech relate to the present system? How does intentionality, meaning and internalization of speech as conceptualized by Vygotsky (1962) develop? Looking, therefore, at

the cognitive affective and psychomotor development of the child, how does this model apply?

Practical Implications

Viewing speech as a learned behavior within the context of a social interaction suggest extensive application, particularly in language teaching and remediation. In the case of children predisposed to speaking at a later age (e.g., Down's syndrome children), or those with severe environmental deficits, information derived from basic research regarding the specific skills that are established during the early stages of mother-infant interaction provides direction and meaningful material for intervention strategies.

Extensive research information on the qualitative development of the preverbal communication, skills and competencies in infants could possibly form the basis for designing an index of mothering. This would entail collection of a representative sample of communicative behaviors in newborn infants and their mothers. A collection of observed behaviors as they occur naturally could form the basis for developing this index.

In summary, the present study has shown the relevance of the learning model in early mother-infant interaction. It supports the role of nonverbal communication and the idea that language learning and teaching begins early indeed. Furthermore, it also provides a theoretical rationale for language study. While extension of the study to cover the basic neonatal period prior to two weeks old and beyond the three month period is recommended to attain a holistic view of

actual speech and language development, this study has shown the viability of the functional analysis of behavior in the nonverbal domain of early mother-infant communication using the McLeish Martin Coding System.

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APPENDICES

APPENDIX A

A PRELIMINARY INVESTIGATION OF MOTHER AND CHILD INTERACTION: VERBAL BEHAVIOR

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A PRELIMINARY INVESTIGATION OF MOTHER AND CHILD INTERACTION: VERBAL BEHAVIOR

This preliminary investigation was set up to discover the potential difficulties involved in this area of study, and to determine the dimensions open to experimental treatment on the question of how a child learns to speak, and how this complex art is taught, although largely unaware of the child's mother. This introductory study was deemed useful in obtaining a concrete outline of the pitfalls inherent in a longitudinal study on speech acquisition, using a behavioral approach. A more specific aim was the identification of operants present in the mother and child interaction among children of varying ages using a Skinnerian taxonomy of verbal and nonverbal operants. These operants are better understood as a classification of communicative behaviors.

Hypotheses

Using the theoretical framework of this study, the following questions were asked regarding the mother and child interaction:

1. Which, if any, of the McLeish-Martin Categories for analyzing communicative behavior are applicable in the mother and child interaction?

2. Is the nonverbal mode of communication identifiable in the subjects of this study?

3. Is the verbal mode of communication identifiable in the subjects of this study?

Method

Sample

The same of this study which consisted of five infants whose ages ranged from 3 weeks to 11 months and their mothers, were drawn from central Edmonton, and were observed for a period of two months. Three male and two female first-born Caucasian, English-speaking subjects comprised the sample of this study. A younger age group was originally intended; however, the paucity of mothers with newborn babies willing to participate in this study, as well as the limited period available to recruit subjects, made it impractical to follow an earlier proposal. The choice of age at which observations started was determined on the basis of subject availability. Reports on biographical studies such as the one given by Church (1966) shows that verbal operants as defined by Skinner are emitted as early as the second week of birth. The upper limit on age was also chosen out of necessity.

Children included in this study were born in a hospital. The rationale behind this decision was based on a practical problem of ascertaining normalcy in the child. Since the determination of this variable is particularly difficult in young infants, the Apgar Score which is available for hospital-born babies was originally intended for use in this study. Legal difficulties involved in obtaining this information at short notice obliged the experimenter to drop this control at this time. The Apgar Score covers an evaluation of the heart rate, respiratory effect, muscle tone, response to catheter in the nostril, and color.

Instruments

Coding system. The McLeish-Martin Categories for the Analysis of Communicative Behavior (1975) was used to identify the operants emitted in the mother and child interaction. The use of this instrument to code behavior was intended to objectify observations. Before embarking on this study, the investigator received instructions and training in the use of the Categories system.

The McLeish-Martin Categories for the Analysis of Communicative Behavior is an extension of Skinner's Verbal Operants. While retaining the first five categories (mand, tact, extended tact, and intraverbal), the sixth category, known as "autoclitic", has been refined by subdividing it into four sub-categories: dominant control autoclitic, negative affective autoclitic, informative autoclitic, submissive control autoclitic, and positive affective autoclitic.

Recording equipment. To record mother and child interaction for the purpose of coding behavior during observations, a Sony VTR equipped with a microphone and a monitor were used.

Procedure

General information about the observations. Observations were to be conducted in a more controlled laboratory setting. Since most parents did not find the proposed arrangement viable, last minute plans were substituted. Subjects in this study were observed in their own homes. Four weekly observations were set up, but this schedule was not adhered to on account of equipment failure, children's illnesses, and various problems relating to family mobility of the participants

involved in this study. Despite the length of time allotted for data collection, the exact number of observations did not total to four. A detailed account of the difficulties in collecting data for this study is summarized following the summary and conclusions section.

Preliminary steps in observation. Mother and child interaction of subjects in this study were videotaped in their own homes for a period ranging from 10 to 30 minutes, twice within the span of two months. The duration of taped observations varied due to exigencies that arose in some sessions. Only two of the planned four observations were successfully completed for three sets of subjects, although all four sessions were attempted. One of the five sets of subjects dropped out before videotaped observations took place after mother delivered a premature child, and the fifth mother in the sample moved north on sudden and short notice.

The investigator spent one session with all subjects to establish rapport and to inform the children's mothers that the study was designed to look at mother and child interaction in an attempt to understand how children learn to talk. They were told of the four weekly observations intended to be 30 minutes each before they were asked to give their commitment to this study. Following mothers' agreement to take part in this study, they were instructed to act as naturally as they could during the observations. They were left to choose the activity or activities they would engage in during these sessions. This was deliberately done to allow a range of behaviors to emerge which is crucial in the application of the Category System used to code behaviors in this experiment.

Observation procedures. Each mother was consulted by the investigator as to the nature of the task she had in mind prior to setting up of the videotape equipment. When the mother, child and investigator were ready, videotaping took place. The investigator remained behind the camera to monitor the observation and equipment and was as unobtrusive as possible. At the end of the session, the child's parents were shown the results of the taping.

Analysis. The tool used to analyze the data was the Category System for Communicative Behavior. Prior to coding of behaviors, the investigator had to familiarize herself with the taped material to facilitate the identification of emitted operants. Two of the six tapes were analyzed. The time required to analyze all tapes is beyond the scope of the present study. Time was limited and several instances of equipment breakdown suffered all throughout the duration of the data collection, made it impossible to analyze all the data collected. After noting the operants emitted, they were coded according to the 10 categories for Communicative Behaviors (McLeish & Martin, 1975). The identification of each operant involved selecting a behavior and tracing its history by looking at the preceding behavior of either mother or child.

Results

A full analysis conducted on two observations on the first set of subjects when the children were 3 weeks and 1 month, respectively, showed that eight out of 10 operants were emitted in the mother and child interaction as presented in classified transcript form and graphs.

Both the verbal and nonverbal forms of communication may also be noted in the following:

Observation 1

Subject: Jason and mother (first observation)

Age: 3 weeks, 1 day

Scene: Bath time

Duration of observation: 10 minutes

Length of tape analyzed: 10 minutes

Types of operants emitted:

1. Mand
   (a) Child starts crying, and as crying became progressively louder, mother said "Hey" aloud to stop him from crying.
   (b) Child starts to kick and cry aloud. Mother says "Hey" again to quiet him down.
2. Tact
   (a) After laying child down on table where bathing took place, mother said, "There".
   (b) After child's cry died down, mother said "Ooh".
   (c) After combing child's hair, mother said "There".
   (d) Child stops crying and mother says "There".
   (e) Mother carried child after bath time was over and said "There, finished".
3. Submissive control autoclitic
   (a) Child cries aloud. Mother picks up baby.

4. Positive affective autoclitic

(a) Mother wipes child's face and tenderly says "Umm".

(b) After dressing child, mother says "There, nice baby, eh!"

Observation 2

Subject: Jason and mother (second observation)

Age: 1 month

Scene: Bath time and nonstructured activities

Duration of observation: 30 minutes

Length of tape analyzed: 30 minutes

Types of operants emitted:

1. Mand

(a) Mother touches child's cheek and says, "Come on, you smile".

(b) Mother sees child in process of yawning: "Are you going to lay down?"

(c) Child yawns, stretches while mother looks and cuddles him: "Go to sleep, hmm." She rocks him to sleep.

(d) Child cries louder. Mother says "Hey" aloud.

(e) Looks at child and says, "You smile, come on, hey, hey".

2. Tact

(a) After combing child's hair, mother says "There", and hugs child several times.

(b) Mother wraps child in a blanket and says, "There, all finished, hmm".

Subject: Jason and mother
Age: 3 weeks, 1 day
Scene: Bath time
Duration of observation: 10 minutes
Length of tape analyzed: 10 minutes

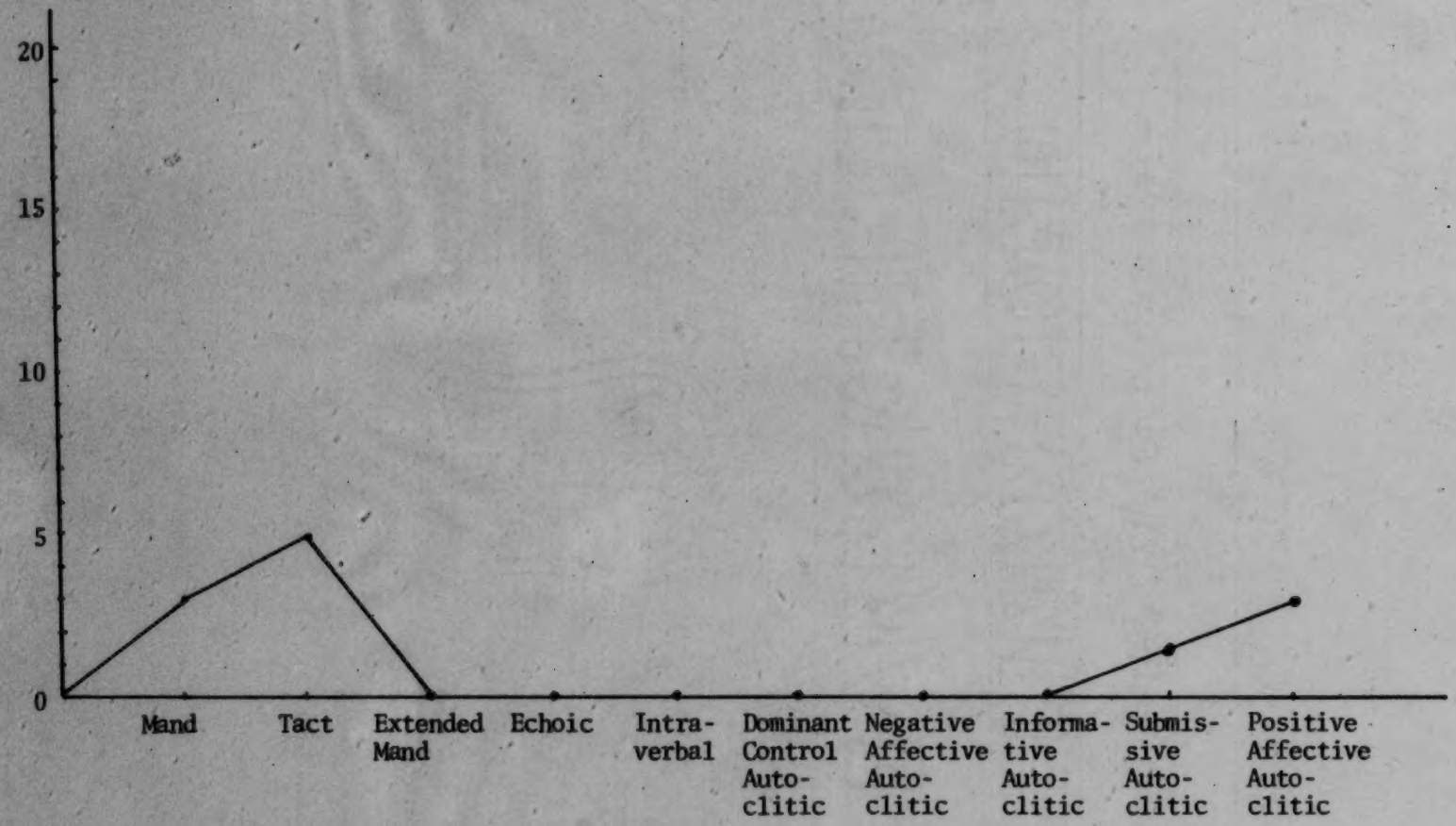

Figure 1: Graph of mother's operants emitted in mother and child interaction (first observation)

(c) Positions child so he is facing camera: "There, you can see."

(d) Mother was unable to solicit smile from child: "No? So serious all the time, hmm."

*(e) Mother walks away from child. Child follows mother with his eyes.

*(f) Mother pours water in sink. Child is frightened by noise and looks in the direction of noise.

(g) Child hiccups and starts to cry. Mother looks at child as a result of the noise he made.

(h) Child's crying gets louder. Mother tries to terminate phone conversation.

(i) Child hiccups again. Mother says: "You've got the hiccups. You're so spoilt, hmm, yeah."

(j) Mother places child's face in front of her and says: "Yeah, poor baby, yeah."

(k) Child leans head on mother's shoulder: "You are tired, hmm?"

(l) Child hiccups again. Mother touches child's face and strokes head.

(m) Child hiccups loudly. Mother comments: "Woo! Sure is a bad hiccup, huh?"

(n) Child hiccups more. Mother says, "Um, bad, yeah".

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*Asterisk indicates that operant was emitted by child.

(o) Child cries. Mother moves and strokes child and draws him closer to her.

(p) Mother gives child pacifier after he cries.

(q) Child won't stop crying. Mother says "Woo" while rocking him and "Spoilt baby". She gives him his pacifier again.

(r) Child cries. Mother rocks child more vigorously.

(s) After child fell asleep, mother placed him in his cot and said, "There".

3. Extended tact

(a) Mother looks at child: "Have you been spying, hmm?"

4. Echoic

(a) Child yawns and mother imitates child and produces yawning noises.

5. Intraverbal

(a) Child cries louder. Mother approaches child and says, "Oh my". She lifts him and pats his back.

6. Informative autoclitic

(a) Mother looks at child: "Hm, it is nice outside today."

7. Submissive control autoclitic

(a) Child groans. Mother looks at child attentively.

*(b) Mother produces smaking noises. Child looks towards her.

(c) Mother looks at child, hugs him close to her, pats his back and observes him admiringly.

(d) Mother positions child to face her and looks at him for a lengthy period of time, tenderly.

(e) Mother examines child's face closely, and looks attentively again.

(f) Child hiccups. Mother looks at him intently and admiringly and smiles.

8. Positive affective autoclitic

(a) Mother lifts child by the arm and sits him up: "That's good."

(b) Mother looks at child's face, lifts him towards her and kisses him.

(c) Child lifts his head towards mother and she helps him raise his head to face her. She smiles, nods and makes a smacking noise.

(d) Child opens mouth while mother is observing him closely. Mother smiled and kissed him several times.

(e) Child moves mouth like a grin. Mother imitates movement, smiles and comments, "Oh, that stupid grin".

Discussion

Both verbal and nonverbal operants were identified in this study employing the Category System for Coding Behaviors. Both the Dominant Control Autoclitic and the Negative Control Autoclitic did not show in the one-sample analysis conducted. It is, however, possible that these operants are present in the tapes of older children which were not coded owing to time restrictions imposed by frequent equipment failure.

The coding system used in this study was useful in classifying mother and child communication; however, each of the 10 coding

Subject: Jason and mother
Age: 1 month
Scene: Bath time and other nonstructured activities
Duration of observation: 30 minutes
Length of tape analyzed: 30 minutes

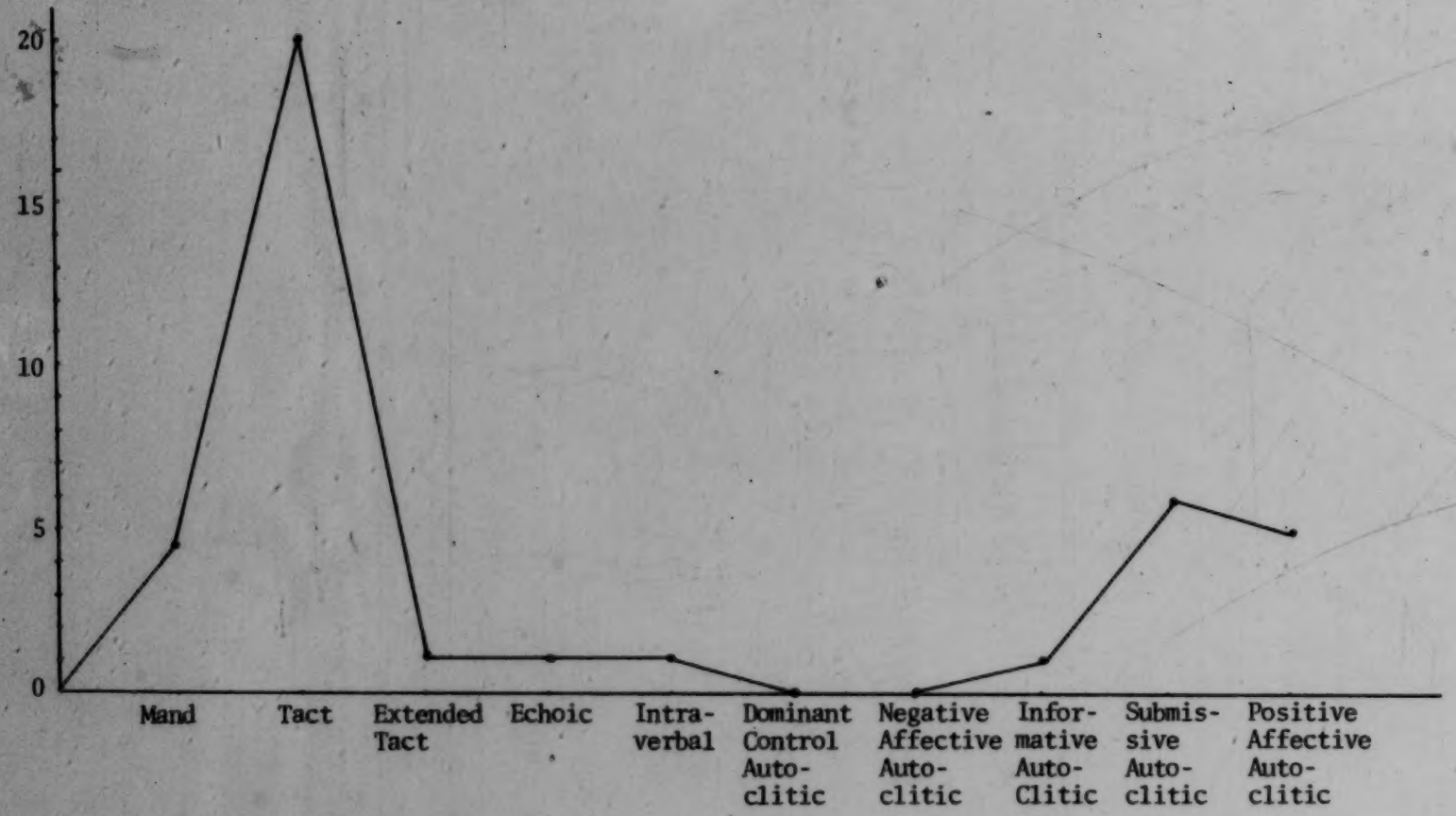

Figure 2. Graph of verbal operants emitted in mother and child interaction.

categories need expansion, particularly in the nonverbal area, since most of the child's behaviors fall under the rubric of unorganized verbal language as most adults use it. In this experiment most of the child's reflex actions were interpreted by the mother. For example, when a child's mouth changed shape similar to an involuntary movement, the mother regarded this as an effort on the child's part to smile and therefore she encouraged the child to do so. It would therefore appear that the mother's interpretation of the child's actions which start out as reflex is an important aspect to look at in the shaping process. Since a mother seems to watch her child's movements intently, she is able to make various types of interpretation for the child who requires this type of egocentric attention for survival.

When a child is not particularly attending to mother, she tends to call his attention. Functionally, this would be the reason why Mands are generally present in the mother and child interaction. Of the 10 operants, Tact appears to be the most frequently emitted operant. This may be understood by the frequency in which the child's mother interprets not only the child's actions, but the events and objects surrounding the child as well.

The frequency of the Submissive Control Autoclitic in the mother and child interaction could be due to a tendency on the mother's part to take a subservient role due to his dependency on her, which places her under the child's control.

The absence of the Dominant Control Autoclitic and the Negative Control Autoclitic could be a function of the child's age. In a newly-born infant, the mother may not be as controlling of her child

since she is in the process of discovering his natural propensities and his behaviors, thus she may be in a position to enjoy the child and be generally affectionate rather than negative towards him. Since the analyzed sample is that of a first-born child, this interpretation may hold true. Results of this study are fairly limited in that they cannot be readily generalized without further extensive work.

The child's limited number of emitted operants compared to that of his mother may be partly due to his lack of awareness of the varied aspects of his environment, his lack of experience and his level of maturation.

Recommended changes

The McLeish-Marting Coding System requires refinement in the nonverbal area for specific use in the coding of mother and child's communicative behaviors. It seems appropriate to include reflex activities a newborn infant is frequently emitting. A list of these behaviors may be used as a starting point in the expansion of nonverbal behavior. Crying, for instance, appears to be open to different interpretations, depending upon the person listening and knowledge of the actual situation the person is in.

A reliable VTR unit to be used by the experimenter alone during the duration of the study is of primary importance in this study to avoid missed observations and to expedite the laborious process of coding behaviors which seem to be the most time-consuming aspect of the study.

Observations should last no longer than 10 minutes at a stretch

to avoid monotony on the part of the mother concerned. Two 10-minute sessions once every three or four weeks would be much more practical. Control over events such as holidays, family dislocation, etc. should be built in the study.

Arrangements to obtain legal permission to procure the Apgar Score of each child at the time the mothers are initially interviewed for possible participation in the study should be made. The lack of availability of trained coders should be resolved at the initial stages of the study to facilitate obtaining an inter-reliability score.

Summary and Conclusion

This preliminary investigation was conducted to determine the viability of the McLeish-Martin Category System for Communicative Behavior in mother and child interaction for use in analyzing the historical development of speech, from a behavioral frame of reference. A secondary aim is to clarify the most likely difficulties encountered in this type of research, and arrive at a realistic position in the execution of the theoretical model posited.

The analysis of two observations on one sample out of five sets of subjects gives an indication of the usefulness of the coding system employed; however, it also requires expansion and possible extension or minor revision in the nonverbal area of the 10 categories of operants.

Summary of Completed and Uncompleted Observations

1. Jason and mother

Session 1 (2 weeks old): VTR broke down; no observation.
Session 2 (2 weeks old): Observation completed (10 minutes due to interruptions).
Session 3 (3½ weeks old): Mother not available due to employment changes; no observation.
Session 4 (1 month old): Observation completed (30 minutes).

2. Melanie and mother

Session 1 (5 months, 23 days): Observation completed (30 minutes).
Session 2 (6 months): Melanie had the mumps; no observation.
Session 3 (6 months, 7 days): Observation completed (20 minutes); AV erased tape accidentally while repairing VTR.
Session 4 (6 months, 14 days): Observation completed (15 minutes only due to equipment failure).

3. Shannon and mother

Session 1 (10 months, 15 days): Observation completed (30 minutes).
Session 2 (10 months, 22 days): Sick with flue; no observation.
Session 3 (10 months, 29 days): VTR broke down.
Session 4 (11 months, 6 days): VTR broke down again.

4. Corey and mother

Session 1 (4 months, 22 days): Observation completed (30 minutes).
Session 2 (5 months): Mother had to attend to family emergency; no observation.
Session 3/4: Left Edmonton suddenly; no observations.

5. Craig and mother

Session 1 (7 days): Mother decided child not a good subject since child was born premature; no observations at all.

APPENDIX B

BALES' INTERACTION PROCESS ANALYSIS SYSTEM

(1970)*

APPENDIX B

BALES' INTERACTION PROCESS ANALYSIS SYSTEM

(1970)*

SOCIAL-EMOTIONAL AREA

A. Positive (and Mixed) Actions
   1. Seems friendly
   2. Dramatizes
   3. Agrees

TASK AREA

B. Attempted Answers
   4. Gives suggestion
   5. Gives opinion
   6. Gives information

TASK AREA

C. Questions
   7. Asks for information
   8. Asks for opinion
   9. Asks for suggestion

SOCIAL-EMOTIONAL AREA

D. Negative (and mixed) Actions
   10. Disagrees
   11. Shows tension
   12. Seems unfriendly

KEY:
a. problems of information
b. problems of evaluation
c. problems of control
d. problems of decision
e. problems of tension-management
f. problems of integration

Summary of Priority Rules for Scoring

The following rules are to be used in cases of conflict as to where an act should be scored. With only minor exceptions, a given act is to be placed in one and only one category.

1. Give priority to a scoring in category 2, Dramatizes, or category 11 Shows Tension, over scoring in any other category. This rule is particularly relevant to acts that would otherwise be placed in category 6, Gives Information. Whenever the action of a person or imaginary being is reported, even though the group member reporting it may feel he is giving information, the interaction observer should place the act in category 2.

2. Give priority to a scoring in category 1, Seems Friendly, or in category 12, Seems Unfriendly, if an element of interpersonal feeling is present. This rule is particularly relevant to acts that would otherwise be categorized as giving opinion and giving suggestion. Simple acts of agreement and disagreement are examples.

3. Give priority to a scoring in category 4, Gives Suggestion, or Category 9, Asks for Suggestion, over a scoring in category 5, Gives opinion. Do not score an act in category 5, Gives Opinion if you can reasonably score it in any other category.

4. After an initial act of disagreement, or of agreement, the scoring reverts to the neutral categories based upon the interaction form of the act. This rule prevents categories 10 and 3 from being used as a "sink".

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*Bales, R. F. Personality and Interpersonal Behaviour. Holt, Rinehart, and Winston, New York, 1970.

APPENDIX C

CATEGORY SYSTEM FOR ANALYSIS OF COMMUNICATIVE BEHAVIOR (McLeish and Martin, 1975)

APPENDIX C

CATEGORY SYSTEM FOR ANALYSIS

OF COMMUNICATIVE BEHAVIOR

(McLeish and Martin, 1975)

OPERANT CATEGORIES	DEFINITIONS	EXAMPLES: BEHAVIORS INCLUDED
1. Mand	A verbal operant in which the response is reinforced by a characteristic consequence. The response is therefore under the functional control of relevant conditions of deprivation or aversive stimulation.	Vocal: 1. "Can you tell me what your name is?" 2. "Forget about that." 3. "Let's stop avoiding the task." Non-vocal: 4. Questioning glances. 5. Directing gestures of command, etc.
2. Tact	A verbal operant in which a response of given form is evoked (or at least strengthened) by the actual presence of a particular object, or event, or property of an object or event.	Vocal: 1. "His chair is vacant." 2. "The group is anxious." 3. "Here, in this room." Non-vocal: 4. Any acknowledgement of an object, or ongoing physical activity, referred to by gestures.
3. Extended Tact	A verbal operant in which a response is generated by physical properties of objects and events where the association between the speaker's behavior and the physical properties is not commonly reinforced by the particular verbal community.	Vocal: 1. "It's a bloody morgue." (referring to the group situation). 2. "The preacher said so." (referring to the therapist). Non-vocal: 3. Ritualized bowing to the group leader (the gestures are not entirely appropriate to the object actually being responded to).

OPERANT CATEGORIES	DEFINITIONS	EXAMPLES: BEHAVIORS INCLUDED
4. Echoic	A verbal operant in which the response is under the control of verbal stimuli such that the response has formal properties precisely the same as the stimulus.	Vocal: 1. Any spoken repetition. 2. Laughter which follows closely an initial burst of mirth. Non-vocal: 3. Modelling of postures, gestures, etc. by some other participant.
5. Intraverbal	A verbal operant in which the response is thematically related but shows no point-to-point correspondence to the verbal stimulus.	Vocal: 1. "We have certain expectation" (follows upon "The group is waiting for something to happen") 2. "We share a few laughs" (part of an anecdote about friends) Non-vocal: 3. Stretching and yawning (behaviors occur during a monologue on fatigue).
6. Dominant Control Autoclitic	A verbal operant which calls attention to the speaker or what he is saying.	Vocal: 1. "Now." 2. "So." 3. "Well ah'm." Non-vocal: 4. Leaning forward, or leaning back in chair (attention getting). 5. Pause for effect.
7. Negative Affective Autoclitic	A verbal operant which indicates a negative emotional reaction to what has been said.	Vocal: 1. "No fear!" 2. "I doubt it very much!" Non-vocal: 3. Cutting across the flow of communication with a disruptive gesture. 4. Looking away from the speaker. 5. Clicking a cigarette lighter when someone else is speaking.

OPERANT CATEGORIES	DEFINITIONS	EXAMPLES: BEHAVIORS INCLUDED
8. Informative Autoclitic	A verbal operant which clarifies or alters the effect of a given communication but does so without any indication of emotion.	Vocal: 1. "I see where. . ." 2. "On the other hand . . ." 3. "However, it could be . . ." 4. "I wish. . ." etc. Non-vocal: 5. Any dramatization or gesture which clarifies other verbal behaviors; e.g. a shrug which accompanies the word "confusion."
9. Submissive Control Autoclitic	A verbal operant which indicates passive acceptance.	Vocal: 1. A bland "yes." Non-vocal: 2. Attentive listening postures. 3. Direct and continuing eye contact with speaker.
10. Positive Affective Autoclitic	A verbal operant which indicates a positive reaction to what has been said.	Vocal: 1. "I agree." 2. "Definitely." Non-vocal: 3. Smiling. 4. Nodding. 5. Laughing at a joke, etc.

APPENDIX D

BACKGROUND QUESTIONNAIRE

APPENDIX D

BACKGROUND QUESTIONNAIRE

CHILD'S NAME: _____ SEX: _____

ADDRESS: _____

ETHNIC ORIGIN: _____ BIRTHPLACE: _____

BIRTHDATE: _____

FAMILY PHYSICIAN: _____

CONSENT FOR REPORT: Yes _____ No _____

SIBLINGS: Name Birthdate

BIRTH & DEVELOPMENT: (Prenatal difficulties, if any)

BIRTH: (Normal, breech, forceps, caesarian section, anaesthetic used, etc.)

Did mother and baby leave hospital soon after birth: _____

PERIOD OF GESTATION:

Bing, E. S. The effect of child rearing practices on development of differential cognitive abilities. Unpublished doctoral dissertation, Stanford University, 1962. (University Microfilms No. 62-4040).

FEEDING PROBLEMS (If any):

FEEDING SCHEDULE: (Initially and subsequent changes)

HEALTH: (Refers to both mother and child)

MEDICATIONS CHILD IS ON (If any):

PLANNED PREGNANCY? Yes _____ No _____

PARENTS' BACKGROUND

Father:

Name _____ Age: _____

Present occupation: _____

Educational Attainment: _____

Is father the only child in the family or were there other siblings?

_____

Has father any practical experience with child rearing?

_____

Experience obtained from looking after his own brothers or sisters?

_____

Experience obtained from looking after other children in a child caring capacity? _____

Experience obtained from profession, e.g. Nursing, etc.?

_____

Only theoretical knowledge in child rearing? _____

Where obtained? _____

Mother:

Name: _____ Age: _____

Occupation (before child's birth) _____

Educational attainment: _____

Is mother the only child in the family or were there other siblings?

_____

Has mother any practical experience with child rearing?

_____

Experience obtained from looking after her own brothers or sisters?

_____

Experience obtained from looking after other children in a child caring capacity? _____

Experience obtained from profession, e.g. Nursing, etc.?

_____

Only theoretical knowledge in child rearing? _____

Where obtained? _____

How does mother determine when the child is comfortable?

_____

Which behavioral cures does she rely upon?

2nd week: _____

4th week: _____

6th week: _____

8th week: _____

10th week: _____

12th week: _____

RESIDENCE & TRAVEL:

Who else other than the nuclear family live in the house?

_____

Places the child has travelled during the 3 months of observation.

_____

CHILD'S FIRST THREE MONTHS:

Who regularly feeds, changes, bathes, and watches the baby during the day and night?

	Daytime	Nighttime
2nd week:	_____	
4th week:	_____	
6th week:	_____	
8th week:	_____	
10th week:	_____	
12th week:	_____	

Does mother receive help in her child caring duties from father, relatives, or others? _____

How? _____

_____

How much time does the child's mother spend with the child during the first 12 weeks (state it in numbers of hours per day)?

2nd week: _____

4th week: _____

6th week: _____

8th week: _____

10th week: _____

12th week: _____

What does the child's mother do with the child during the first three months? Give specific examples.

2nd week: _____

4th week: _____

6th week: _____

8th week: _____

10th week: _____

12th week: _____

How about the child's father or other adults in the house? How much time per day do they spend with the child?

2nd week: _____

4th week: _____

6th week: _____

8th week: _____

10th week: _____

12th week: _____

What does the child's father and the other members of the household do with the child? Please give specific examples.

_____

_____

Does mother keep a baby book? _____

When did the child start playing with a toy? _____

What kind of toys? _____

When did you and others in the house use a toy in playing with the child? _____

If so, what toys did you use? _____

_____

LANGUAGE:

What was the first single sound that the child made? _____

How old was she/he at that time? _____

Later sounds:

2nd week: _____

4th week: _____

6th week: _____

8th week: _____

10th week: _____

12th week: _____

What are the languages spoken at home? _____

What language is used in speaking to the child? _____

CHILD'S ACTIVITIES:

What are the child's regular daily activities? How long does the child engage in each of these activities?

	Morning	Afternoon	Evening
2nd week:			
4th week:			
6th week:			
8th week:			
10th week:			
12th week:			

FEEDING CHARACTERISTICS:

Is the child breast fed? _____

Is feeding scheduled or by demand? _____

ASPIRATIONS:

Are there things that you think a boy/girl of his/her age should be expected to do?

2nd week: _____

4th week: _____

6th week: _____

8th week: _____

10th week: _____

12th week: _____

What career(s) would the child's father prefer for the child?

_____

What career(s) would the child's mother prefer for the child?

_____

Are there any career(s) that the child's father or mother definitely would not like the child to pursue?

Yes _____ No _____

If yes, what are they? _____

How much education do you expect the child to receive?

_____

What specific degree do you expect him/her to complete?

_____

Are there any grandparents' aspirations (earlier tradition) for the child? _____

_____

APPENDIX E

RELEASE OF INFORMATION

APPENDIX E

RELEASE OF INFORMATION

I, _____ and my child _____ presently participating in a research project at the Educational Psychology Department of the University of Alberta, give permission for Miss Teresita A. Jose, members of her thesis committee, andher project assistants to use the video taped recorded sessions taken between _____ _____ (date inclusive) for purposes of this study only.

Dated at _____ this _____ day of _____ A.D., 19 _____.

_____ (Witness)

_____ (Parent)

_____ (Address)

_____ (Address)

_____

_____

APPENDIX F

OBSERVATION SCHEDULE

APPENDIX F

OBSERVATION SCHEDULE

JAMES Y.

Date of Birth: May 30, 1977.

Date of Actual Observations	Age of Infant
1. June 13, 1977	14 days old
2. June 27, 1977	28 days old
3. July 11, 1977	42 days old
4. July 25, 1977	56 days old
5. August 8, 1977	69 days old
6. August 29, 1977	90 days old
Attempted Observations	**Reason for Failure**
6. August 22, 1977 at 83 days old.	All of the family were away on an unexpected holiday.
Time of Actual Observations	
1st, 2nd, 3rd, 4th and 6th observation:	Between 4:00 and 4:30 p.m.
5th observation:	10:30 p.m.

CHRISTOPHER H.

Date of Birth: June 22, 1977.

Date of Actual Observations	Age of Infant
1. July 14, 1977	22 days old
2. July 27, 1977	35 days old
3. August 16, 1977	54 days old
4. August 30, 1977	68 days old

5. September 12, 1977	81 days old
6. September 29, 1977	98 days old
Attempted Observations	Reason for Failure
1. July 6, 1977 at 14 days old.	Mother was not ready to have any visitors at home.
3. July 11, 1977 at 49 days old.	Mother declined observation on account of arrival of unexpected relatives.

Time of Actual Observations

1st, 2nd and 3rd observation:	2:30 to 3:30 p.m.
4th, 5th and 6th observation:	4:00 to 5:30 p.m.

BRETT N.

Date of Birth: June 11, 1977

Date of Actual Observations	Age of Infant
1. June 25, 1977	14 days old
2. July 9, 1977*	28 days old
3. July 22, 1977	41 days old
4. August 5, 1977	55 days old
5. August 22, 1977	72 days old
6. September 9, 1977	90 days old

*While the 2nd observation was completed, the sound system was not functional.

Attempted Observations	Reason for Failure
6. September 5, 1977 at 86 days old.	Brett was ill just after a short holiday.

Time of Actual Observations

1st, 2nd and 3rd observation: 2:00 to 3:00 p.m.

4th, 5th and 6th observation: 6:30 to 9:30 p.m.

ERIN Mc.

Date of Birth: August 18, 1977

Date of Actual Observations	Age of Infant
1. September 11, 1977	24 days old
2. September 27, 1977	40 days old
3. October 11, 1977	54 days old
4. November 1, 1977	75 days old
5. November 7, 1977	81 days old
6. November 23, 1977	97 days old

Attempted Observations	Reason for Failure
1. September 1, 1977 at 14 days old.	Mother not ready for observation.
September 8, 1977 at 22 days old.	Video tape machine failure during actual taping session.

Time of Actual Observations

All observations: 6:30 to 8:30 p.m.

JENNIFER L.

Date of Birth: September 28, 1977

Date of Actual Observations	Age of Infant
1. October 12, 1977	14 days old
2. October 26, 1977	28 days old
3. November 9, 1977	42 days old
4. November 23, 1977	56 days old
5. No Observation	
6. December 20, 1977	83 days old

Attempted Observations	Reason for Failure
5. December 7, 1977 at 70 days old.	Inclement weather.
December 10, 1977 at 73 days old.	Inclement weather.

Time of Actual Observations

All observations: 8:00 to 8:30 p.m.

APPENDIX G

WRITTEN TRANSCRIPT OF THE VIDEOTAPED OBSERVATIONS ON BRETT N. AND MRS. N. USED AS A BASIS FOR CODING INTERACTION

(The 15-minute tape was divided into 5 segments. Each segement represented 3 minutes of interaction. Only three segements of this tape were transcribed and coded for the N-Dyad.)

WRITTEN TRANSCRIPT ON THE N-DYAD

FIRST OBSERVATION

BABY	MOTHER
Sucks	
Cries	- Did you loose it? Here you are.
Um - um	- Quit making such terrible faces.
Sighs	- Oh "yah"
Um, Hm, mm, mm	
mm	- touches Brett's hair
mm	- makes sure breast is in place for Brett
mm, mm	- moves blanket
mm, mm (hands waving)	- wanna hold my hand?
ugh um	- touches Brett's cheek
takes hand away	- oh we'll hold hands
um, mm, mm	
mm	- alright
um mm	- um
cries um um	
continues to cry, moves hands and body (looks uncomfortable)	- oh what's the matter?
	- oh what's the matter? you're ok, it's ok, it's ok.
um, um um	
scratches	- makes sure breast is in Brett's mouth

BABY	MOTHER
moves	- come on, come on.
	Touches Brett's cheek.
	- There you are Brett.
um, um, um, um, um	
moves hands	
cries	
	- what's the trouble? Trouble
cries some more throws hands around	- what's the matter Brett?
	- what's the matter?
continues to cry wriggles body moves about	- just calm down, calm down, calm down
continues to cry um, um	- you want a little burp? Is that what it is?
cries louder um, um hm um, mm cries some more um, um, um	- what's wrong? what's wrong? - it's ok . . . sh . . sh . . sh . . sh . . . strokes Brett's head
um, um, mm um um	- what's the matter? hm? - touches Brett's body
um sucks	- hm - are you alright? sh, sh, sh,
um um - moves hand around	- touches Brett's cheek
	- strokes Brett's head, touches his body, cheeks, then holds his hand
Brett responds by holding mother's hand	- you're cute little hand - what are you looking at? Hm - I want you to go to sleep. Hm

BABY	MOTHER
Hm, wriggles	
	- touches Brett's cheek
um	- when you're done
um um cries	
hm, hm, hm	
moves head, body	
	- touches Brett's cheek
cries, continues to cry	
wriggles	- Makes sure breast is in place for Brett.
	- Brett, what's the matter?
cries	- Do you have a little burp?
cries vigorously	
	- sh - - - - - sh - - - - - sh
calms down	Places breast in Brett's mouth
um um	
cries again	- sh - - - - -
- stops crying	- Brett
- um, m, m,	- what's the matter? What's the matter? Touches Brett
- um	- Do you want a burp?
um, mm, wriggles	- you are there
- um, hm	
- um, hm	
um, mm	- what's upsetting you? Touches Brett. Now what's the matter? Touches Brett's stomach then couches his clothes and ensures it is in place.
- um mm m	
stops crying	
- starts again	
hm hm - - - -	
- crying gets louder	
- hm hm hm	- um, shall we have a hot bath?
- Brett moves head and hand	- sure
- um um um	
um wriggles,	
Burps, Toots	- oh, oh, - - - goodness - - - - I've just bathed you. oh - - - Brett - - - laughs - - - you feel better. Do you? Do you? Do you feel better? Mommy has gonna have to change you now. Um - um Okay?
	- Touches Brett's hair and places hand under his bottom

BABY	MOTHER
- um, um, um moves his feet and body	- I think we'll have to have our towel. Um hm - come on - touches Brett's cheek
moves body & fingers	- Do you eat always with one little finger up? um hm - - - hm - - - laughs - one of the little fingers. Mother touches Brett - um hm
moves finger um hm - sucks, licks and wriggles	- suppose to be this one there
	- where's your hands?
um m m	- Brett - - - oops - - - there you are
um um	- open up
um m m m m	- careful - - - oh, I see well - a little more? Laughs
- expels air	- um hm Touches Brett's face Come on.
- expels air again	- Laughs. Um, hm. - Do you want to go to the bathroom?
wriggles - Um mm -	- Mommy wipe your face? There. Oh - Brett
- cries - moves, wriggles	- Puts breat in Brett's mouth
	- Hm?
- expels gas again	- touches Brett's cheeks tenderly - aren't you hungry?
- wriggles	- it is supposed to be dinner
- um hm said aloud - sucks loudly - um . . . wriggles - um . . . expels air again	- um hm - kisses Brett. Atta boy. - oh, god. What shall we do?
- um	- um hm. Is your diaper uncomfortable? - said laughingly
- moves fingers	- Is your little diaper damp? A little goey - hm? Touches Brett's head - hm um? Come on.

BABY	MOTHER
- sucks quietly	- come on. I'll change you as you are done. - Holds breast to make sure Brett has it.
- ugh -	- You look a bit tired.
	- You had your snooze and now you're up.
- Breathes loudly and burps	- Do you mommy's hand? Hm? Hm? - said lovingly
- Burps - Breathes loudly and makes pleasant sounds	- Looks at Brett intently.
- Breathes aloud Um - and moves	- Mother holds Brett's hand
- gulps aloud	- mother moves her breast with finger. Touches Brett and whispers - Does that look good?
	- Holds Brett's hand again. Then looks at clock in the room.
- gulps	- Holds nipple again for Brett. Holds his hand, then both hands. Strokes Brett's cheeks. Come on. Holds and feels Brett's bottom.
- continues to suck without moving Gulps	- What are you thinking about? Um?
- Moves, sighs - Um. um . .	- Mother holds Brett's hand.
- Brett pulls his hand away.	- Mother places her hand on his bottom.
- moves hand, wriggles	- Mother holds hand.
- moves hands and wriggles (seemed uncomfortable)	- Mother's hand is on Brett's bottom.
- um, um, hm (pleasant sounds)	- Can you say gooo - hm?
- wriggles - Um. Moves	- touches Brett's head and places

BABY	MOTHER
	her hand to support his bottom. You can eat some more - can't you? Touches Brett's chin. Um hmm - - Strokes his head.
- moves	- getting sleepy - looks at clock in the room
- um	- holds Brett's hand - strokes his head and face. Come on.
- moves - um	- strokes Brett's cheek
- sucks - um - moves	- um hm - touches Brett's bottom.

APPENDIX H

EXPANDED AND REVISED
CATEGORY SYSTEM EXAMPLES FOR THE ANALYSIS
OF COMMUNICATIVE BEHAVIOR
FOR USE IN EARLY MOTHER-INFANT INTERACTION

APPENDIX H

EXPANDED AND REVISED

CATEGORY SYSTEM EXAMPLES FOR THE ANALYSIS

OF COMMUNICATIVE BEHAVIOR

FOR USE IN EARLY MOTHER-INFANT INTERACTION

OPERANT CATEGORIES	FUNCTIONAL DEFINITIONS	EXAMPLES: BEHAVIORS INCLUDED
Mand	A verbal operant in which the response is reinforced by a characteristic consequence. The response is therefore under the functional control of relevant conditions of deprivation or aversive stimulation.	Verbal: 1. Mand for movement: Stand right up. 2. Mand for attention: Hey Brett. 3. Mand for information: Are you hungry? Are you choking? 4. Mand for confirmation: Aren't you? Isn't it? 5. Mand for continuation: Come on (encouraging infant to continue feeding). Non-verbal: 6. Places baby over shoulder for a burp. 7. Mother directs child's head to breast. 8. Mother moves baby's head to make sure he is facing her when talking to him. 9. Aaghs sounds made by the baby to call mother's attention.
Tact	A verbal operant in which a response of given form is evoked (or at least strengthened) by the actual presence of a particular object, or event, or property of an object or event.	Verbal: 1. Getting fingernails. 2. There's fuzz in your ear. Non-verbal: 3. Stares at baby's face. 4. Looks at camera. 5. Sucking. 6. Smacks lips.

OPERANT CATEGORIES	FUNCTIONAL DEFINTIONS	EXAMPLES: BEHAVIORS INCLUDED
Extended Tact	A verbal operant in which a response is generated by physical properties of objects and events where the association between the speaker's behavior and the physical properties is not commonly reinforced by the particular verbal community.	Verbal: 1. You're a hungry boy. 2. That stopped the old feet. 3. You're not very comfortable. Non-verbal:
Echoic	A verbal operant in which the response is under the control of verbal stimuli such that the response has formal properties precisely the same as the stimulus.	Verbal: Any spoken repetition. 1. Self-repeating: e.g. What's over there? What's over there? 2. Repeating others: e.g. Mother: Do you have a goo for me? Child: Guh. Non-verbal: 3. Modelling of postures, gestures, etc. e.g. pouting, sticking tongue out.
Intraverbal	A verbal operant in which the response is thematically related but shows no point-to-point correspondence to the verbal stimulus. (Similar to the Echoic category minus the point-to-point correspondence.)	Verbal: 1. "Mom better not cheat you here." (After mother has gone on talking about food and how hungry the baby is for quite awhile.) Non-verbal: 2. Mother strokes baby's stomach after she hears and comments that she can hear it rumbling.

OPERANT CATEGORIES	FUNCTIONAL DEFINITIONS	EXAMPLES: BEHAVIORS INCLUDED
Dominant Control Autoclitic	A verbal operant which calls attention to the speaker or what he is saying.	Verbal: 1. Now, . . . 2. Well, . . . 3. Au, . . . Non-verbal: 4. Clicking of mother's tongue to maintain baby's attention.
Negative Affective Autoclitic	A verbal operant which indicates a negative emotional reaction to what has been said.	Verbal: Negative verbal expression with negative tone. 1. I will not! (said angrily) Non-verbal: 2. Scratching ear to show annoyance. 3. Fussing. 4. Turning head away from mother when she is busy talking with child. 5. Loud crying or yelling.
Informative Autoclitic	A verbal operant which clarifies or alters the affect of a given communication but does so without any indication of emotion.	Verbal: 1. Your daddy's coming home soon. 2. I think I have an itchy nose. 3. It's going to be a nice day tomorrow. Non-verbal: 4. Any dramatization or gesture which clarifies other verbal behaviors; e.g. a shrug of the shoulders which accompanies the sentence "I don't know." Both the vocal and non-vocal comments offer the same information.

OPERANT CATEGORIES	FUNCTIONAL DEFINITIONS	EXAMPLES: BEHAVIORS INCLUDED
Submissive Control Autoclitic	A verbal operant which indicates passive acceptance.	Verbal: 1. Alright (mother gives in to baby's refusal to take bottle). 2. A bland yes. Non-verbal: 3. Baby closes eyes. 4. Baby in quiescent state after a period of loud crying.
Positive Affective Autoclitic	A verbal operant which indicates a positive reaction to what has been said.	Verbal: 1. That's a good boy. 2. Attaboy! 3. Um hm. 4. Bless you little fellah. Non-verbal: 5. Caresses baby. 6. Tickles baby. 7. Looks at child's face intently. 8. Baby smiling or laughing. 9. Contented sounds um hm . . .

APPENDIX I

INTERRATER RELIABILITY TABLES

TABLE A1

INTERRATER RELIABILITY BETWEEN

TRAINER AND RATER A

SCOTT'S COEFFICIENT OF RELIABILITY

Category	A	B	A%	B%	% Diff.	Ave. %	Ave. $\%^2$	Ave. $\%^2/100$
1	61	59	18.89	19.34	0.45	19.12	365.574	3.656
2	64	61	19.81	20.00	0.19	19.91	396.408	3.964
3	27	25	8.36	8.20	0.16	8.28	68.558	0.686
4	13	12	4.02	3.93	0.09	3.98	15.840	0.158
5	7	5	2.17	1.64	0.53	1.91	3.648	0.036
6	17	17	5.26	5.57	0.31	5.42	29.376	0.294
7	32	29	9.91	9.51	0.40	9.71	94.284	0.943
8	8	7	2.48	2.30	0.18	2.39	5.712	0.057
9	2	1	0.62	0.33	0.29	0.48	0.230	0.002
10	92	89	28.48	29.18	0.70	28.83	831.169	8.312
Total	323	305			3.30			18.108

*Interrater reliability between trainer and rater A = 0.96.

TABLE A2

INTERRATER RELIABILITY BETWEEN

TRAINER AND RATER B

SCOTT'S COEFFICIENT OF RELIABILITY

Category	A	B	A%	B%	% Diff.	Ave. %	Ave. $\%^2$	Ave. $\%^2/100$
1	61	64	18.89	20.58	1.69	19.74	389.67	3.897
2	64	67	19.81	21.54	1.73	20.68	427.66	4.277
3	27	26	8.36	8.36	-	8.36	69.89	0.699
4	13	11	4.02	3.54	0.48	3.78	14.29	0.143
5	7	6	2.17	1.93	0.24	2.05	4.20	0.042
6	17	13	5.26	4.18	1.08	4.72	22.28	0.223
7	32	26	9.91	8.36	1.55	9.14	83.54	0.835
8	8	'9	2.48	2.89	0.41	2.69	7.24	0.072
9	2	1	0.62	0.32	0.30	0.47	0.22	0.002
10	92	88	28.48	28.30	0.18	28.39	805.99	8.060
Total	323	311			7.66			18.250

*Interrater reliability between trainer and rater = 0.91.

TABLE A3

INTERRATER RELIABILITY BETWEEN

TRAINER AND RATER C

SCOTT'S COEFFICIENT OF RELIABILITY

Category	A	B	A%	B%	% Diff.	Ave. %	Ave. $\%^2$	Ave. $\%^2/100$
1	61	59	18.89	18.55	0.34	18.72	350.438	3.504
2	64	60	19.81	18.87	0.94	19.34	374.036	3.740
3	27	25	8.36	7.86	0.50	8.11	65.772	0.658
4	13	13	4.02	4.09	0.07	4.06	16.484	0.165
5	7	5	2.17	1.57	0.60	1.87	3.497	0.035
6	17	19	5.26	5.97	0.71	5.62	31.584	0.316
7	32	29	9.91	9.12	0.79	9.52	90.630	0.906
8	8	10	2.48	3.14	0.66	2.81	7.896	0.079
9	2	2	0.62	0.63	0.01	0.63	0.397	0.004
10	92	96	28.48	30.19	1.71	29.34	860.836	8.608
Total	323	318			6.33			18.015

*Interrater reliability between trainer and rater = 0.92.

TABLE A4

INTERRATER RELIABILITY BETWEEN

TRAINER AND RATER D

SCOTT'S COEFFICIENT OF RELIABILITY

Category	A	B	A%	B%	% Diff.	Ave. %	Ave. $\%^2$	Ave. $\%^2/100$
1	61	59	18.89	19.34	0.45	19.12	365.574	3.656
2	64	63	19.81	20.66	0.85	20.24	409.658	4.097
3	27	24	8.36	7.87	0.49	8.12	65.934	0.659
4	13	11	4.02	3.61	0.41	3.82	14.592	0.146
5	7	5	2.17	1.64	0.53	1.91	3.648	0.036
6	17	15	5.26	4.92	0.34	5.09	25.908	0.259
7	32	29	9.91	9.51	0.40	9.71	94.284	0.943
8	8	6	2.48	1.97	0.51	2.23	4.973	0.050
9	2	2	0.62	0.66	0.04	0.64	0.410	0.004
10	92	91	28.48	29.84	1.36	29.16	850.306	8.503
Total	323	305			5.38			18.353

*Interrater reliability between trainer and rater = 0.93.

APPENDIX J

CODED SAMPLE OF WRITTEN TRANSCRIPT

(PILOT TAPE - CRAIG T. & MRS. T.)

APPENDIX J

CODED SAMPLE OF WRITTEN TRANSCRIPT

(PILOT TAPE - CRAIG T. & MRS. T.)

Use of Coding System is as follows:

1 = Mand; 2 = Tact; 3 = Extended Tact; 4 = Echoic; 5 = Intraverbal; 6 = Dominant Control Autoclitic; 7 = Negative Autoclitic; 8 = Informative Autoclitic; 9 = Submissive Control Autoclitic; 10 = Positive Affective Autoclitic.

BABY	MOTHER
	- You're hungry[3], aren't you?[1]
uh[2] uh[2]	- Ready for a burp?[1] Strokes Craig.[10]
	- Um[10]
uh[2] uh[2]	
	- Don't go to sleep[1] hon.[10]
uh,[2] uh[2]) Sucking uh[2]) Noises uh;[2] uh[2]	
	- Ready for a burp?[1] Sits Craig for a burp.[1]
	- Good.[10]
Burps[2]	
	- Good boy.[10]
Burps[2]	
	- Good boy.[4]
	- You really were hungry.[3]
uh[2] Burps[2]	
	- Oh.[6] . . .Good for you.[10]

BABY	MOTHER
Burps 2	- Oh.6 . . .Good for you.4
	- Does that feel better1 ay?6
	(Mother transfers Craig to the other side.)2
Cries1 - starts to cry - Uh,1 uh,1 then stops.	- Do you still feel something?1
	- Feel better.1
	- Laughs.10
	- You're still hungry,1 aren't you?1
Smacks lips2 with arm movements.2	
	- What are you doing?1 Pats Craig's bottom.10,10,10
Looks at mom.2	
	- You still want some more food?1
	(Mother places her finger in Craig's hand.10
Smacks lips.2	
	- You're smacking your lips2 aren't you?1
	- Smacking your lips (whispered).10
Cries1 Moves arms2 and lips.2	
	- Oh, my!10
	- That's OK.10
	- Mom's10 right here.2
Quietens; tries to sit up;2 Cries,7 Quietens	
Burps2	- Oh, my goodness,10 lie still again.10 Sits Craig for a burp.1
Cries7,1	

BABY	MOTHER
	- Oh my! 10
	- Shh 1 honey. 10
	- OK. 10 . .Ok. 10 . .(Gives breast) 1
	- You want some more food, 1 don't you? 10
Cries louder 1	
	- OK. 10 . .OK. 10 . .
Cries more 1	
	- Boy! 6 You sure are hungry. 3
Quietens 10	
	- Mother places child at breast. 1
Gulps 2	
	- Is that better? 1
	- That's what you wanted, 3 wasn't it? 1
Sucking 2	
	- I can hear it rumbling down in your stomach. 3
	Strokes tummy. 5
Sucking louder 2	
Ah 10	
	- (Picks up Craig's hand) 10
	- Getting fingernails. 2
	- That's amazing. 10
	- Yah. 10 . .oh, my. 10
	- (Rubs Craig's feet) 10 Strokes feet. 10
	- Are your feet warm? 1
	- Are your feet warm? 4

BABY	MOTHER
	- (Stares at baby's face) 2
	- It looks like 8 you're 3 going to sleep again, 6 ay?
	- What a hungry 10 little 3 guy. Looks at Craig with a smile. 10
Uh (Sucking noises) 2	- Hey! 6 What are you looking at? 1 What are you looking at? 4
	- OK! 6 All finished? 1 Takes Craig away from breast. 1
	- Mother sits Craig up. 1
Eyes closed 9	
	- That's good. 10
	- What are you going 1 to think of _____. 10
Flaps arm 2 (stretches) 2 Grunts 2	
	- Where's your smile? 1 (Holds Craig's hand.) 10
Grunts 2 Opens eyes 2	
	- Oh, my! 10
Blinks eyes 2	
	- Getting tired? 1
Eyes open, grasps mom's finger 2 2	
Closes Eyes 7 Opens Eyes 2 Makes noise 7	
	- All those faces 3
Noise 7	

BABY	MOTHER
	- All those faces.[4]
Moves lips[1]	
	- Oh my![10] . . . trying to tell me something.[1]
Cough[7]	
Cries (moves all over)[7]	
	- OK,[10] OK[10] (Rocks baby)[2]
Cries[7]	
Cries[7]	
	- You're not very comfortable,[3] are you?[1]
Cries[7] (short cries)[7]	
	- No.[10]
	- Saying[8] I just didn't get[3] (emphasized) enough food.
uh, uh, uh Cries[7]	
	- OK,[10] OK[10]
	- Mother places Craig over shoulders[1] and pats his back.[1]
	- That feel better.[3]
	- That feel better.[4]
	- OK[10]
	- Can stand right up.[1] Pats Craig's back.[10]
	- Lays baby back on lap.[2]
Head falls	- Opps.[2] . .Opsy.[10] . .Loosing all your clothes here.[3]

BABY	MOTHER
	- Aren't you? 1
	- Oh, 10 yah. 10
Cries 7	
	- OK. 10 . . .OK. 10 . . .OK. 10 . . .OK 10
Continues to fuss 7 (loud cry) 7	
	- You're a real hungry 3 little guy 10 tonight aren't you? 1
Cries 7 (continually) 7,7,7,	
	- Ay! 6 Ay! 6
	- Yah. 6
	- Hey. 6 . . .you're still hungry 3, aren't you? 1
	- I know. 10 Yes I know. 10 (Strokes Craig.) 10
	- I sort 8 of cheated you 3, didn't I? 1
	- A hum. 10 . . .OK. 10
	- What happened to the 5 rest of my dinner? 1
	. . .What happened to the rest of my dinner? 4
	- Oh 10 (moves Craig around) 2
	- Is that what you're saying? 1
	- What happened 4 to the rest of my dinner. . . (face to face). 1
	- OK, 10 OK, 10 Mom better not 5 cheat you here, I guess 8 ay. 10 . . .OK. 10 . . .OK. 10 . . .OK. 10 (Craig placed to breast.) 1
Quietens 9	

BABY	MOTHER
	- Oops.[6] I don't think[8] you're comfortable,[8] are you?[1]
Ah[10]	
	- Getting it all in phases[3] tonight. Aren't you?[1] That better?[10] Strokes body.[10]
	- OK.[10]
Loud sucking[2]	- Such a little glutton[10,3] aren't you?[1]
	- Boy.[6] . .Wow.[10]
	- Saying[8] I've been cheated.[3] . .I've been cheated.[4]
	- I want my whole supper.[5]
	(Microphone Noise)
Cries[7] (continually)[7]	
	- OK.[10] . .OK.[10] . .
	- You are a hungry[3] boy.
	- Aren't you?[1]
	- You are a hungry boy.[4] . .
	- Yah.[6]
	- (Looks toward microphone[2] - fixed)
Cries and kicks[7]	- Oh[6] you're so strong.[2]
	- Your feet are[5] strong.
Kicking feet[7]	- Gives breast[1] to Craig.
	- OK.[10] . .OK.[10] . .
	- You think[8] you want[3] some food, don't you?[1]
	- (Puts to breast.)[1]

BABY	MOTHER
	- There you go. . . .There you go. . . .There you go. . .
Sucking Grabs Mom	- That stopped the old feet, didn't it?
uh uh (Pleasant sucking sounds)	
Grabs Mom	- What are you hanging on to here? (touches hand)
uh uh	- Laughs. . .
	- What are you hunging on to (whispers)
	- Only one minute after that noise and then you're going to sleep. . .
Uh	
	-(Straightens dress.) Sound asleep. . . .?
	- You even suck in your sleep, don't you?
	- (Smiles)
Sucking sound Ah, ah Sucking from breast Cries	
	- OK. . . .had enough to eat, ay? (moves Craig around)
	- Oh you're getting so heavy. . . .0 0 0
	- (Sits Craig and rubs his back)
	- (Lays Craig back)

BABY	MOTHER
	- OK, so you're finished. 10
Cries 7 Sucks loudly 2	
	- OK. 4 Puts Craig back to breast. 1
	- You have some gas? 3
	- Your eyes are starting to close already. 2
Cough 7 Uh 10 Cries 7 Uh, 10 uh 10 Cries 7 Uh, 10 uh 10 Grunts 7 Uh, uh, uh 10	
	_____ . _____
Uh, uh, uh, uh 10 Cries 10	- Oh, my. 10

APPENDIX K

PERCENTAGE OF COMMUNICATIVE BEHAVIORS FOR EACH DYAD FOR THE FIRST, SECOND, THIRD, FOURTH, FIFTH AND SIXTH OBSERVATION

TABLE C.1

PERCENTAGE OF COMMUNICATIVE BEHAVIORS AT THE FIRST OBSERVATION - FIVE DYADS

	Y Dyad		H Dyad		N Dyad		Mc Dyad		L Dyad		Totals	
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother
M	-	23.90	3.29	39.22	-	21.05	-	26.14	-	26.80	0.66	27.42
T	93.10	15.72	68.42	0.49	43.43	8.10	55.56	7.95	100.00	2.06	72.10	6.86
ET	-	4.40	-	7.35	-	7.29	-	6.82	-	3.09	-	5.79
E	-	10.06	-	8.82	-	4.05	-	9.09	-	3.09	-	7.02
IV	-	1.89	-	9.80	-	1.62	-	2.27	-	5.16	-	4.15
DA	-	8.81	-	11.76	-	2.43	-	19.89	-	11.34	-	10.85
NA	0.86	-	13.16	1.96	29.56	-	22.22	-	-	-	13.16	0.39
IA	-	-	-	1.47	-	2.02	-	2.27	-	2.06	-	1.57
SA	4.31	0.63	2.63	2.45	-	-	-	-	-	-	1.39	0.62
PA	1.72	34.60	12.50	16.67	27.01	53.44	22.22	25.57	-	46.39	12.69	35.33

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

TABLE C.2

PERCENTAGE OF COMMUNICATIVE BEHAVIORS AT THE SECOND OBSERVATION - FIVE DYADS

	Y Dyad		H Dyad		N Dyad		Mc Dyad		L Dyad		Totals	
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother
M	-	21.50	11.36	21.36			1.94	22.44	-	22.43	3.33	21.96
T	93.60	19.63	77.27	16.89			67.96	25.21	100.00	1.87	84.70	15.90
ET	-	4.67	-	3.63	Equipment Failure		-	4.43	-	6.54	-	4.82
E	-	10.28	-	7.76			3.88	7.20	-	0.93	0.97	6.54
IV	-	2.80	-	10.96	Evident		-	6.37	-	3.74	-	5.97
DA	-	9.35	-	6.39	After		-	8.86	-	23.36	-	11.99
NA	1.60	-	11.36	-	Observation.		5.83	0.28	-	-	4.70	0.07
IA	-	1.87	-	1.37			-	6.09	-	1.87	-	2.80
SA	-	-	-	3.20			-	0.55	-	-	-	0.94
PA	4.80	29.91	-	28.31			20.39	18.56	-	39.25	6.30	29.01

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

TABLE C.3

PERCENTAGE OF COMMUNICATIVE BEHAVIORS AT THE THIRD OBSERVATION - FIVE DYADS

	Y Dyad		H Dyad		N Dyad		Mc Dyad		L Dyad		Totals	
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother
M	2.02	18.84	3.70	16.38	-	28.80	-	22.60	-	21.67	1.14	21.66
T	76.77	21.74	72.84	5.08	23.85	16.30	79.82	28.75	100.00	1.67	70.66	14.71
ET	-	9.42	-	6.78	-	5.98	-	5.65	-	5.00	-	6.57
E	-	4.35	-	5.65	-	10.87	-	5.41	-	3.33	-	5.92
IV	-	1.45	-	18.08	-	1.63	-	4.42	-	5.00	-	6.12
DA	-	2.17	-	15.25	-	3.26	-	4.91	-	21.67	-	9.45
NA	16.16	-	22.22	0.56	5.17	-	7.89	-	-	-	10.29	0.11
IA	-	-	-	3.95	-	3.80	-	4.67	-	3.33	-	3.15
SA	5.05	-	-	5.65	0.29	-	-	-	-	-	1.07	1.13
PA	-	42.03	1.23	22.60	70.69	29.35	12.28	23.59	-	38.33	16.84	31.18

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

TABLE C.4

PERCENTAGE OF COMMUNICATIVE BEHAVIORS AT THE FOURTH OBSERVATION - FIVE DYADS

	Y Dyad		H Dyad		N Dyad		Mc Dyad		L Dyad		Totals	
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother
M	1.01	20.19	11.84	11.62	-	23.58	6.30	18.63	9.09	43.33	5.65	23.47
T	79.80	15.38	72.37	5.56	53.04	12.74	27.56	27.33	57.58	-	58.07	12.20
ET	-	2.88	-	6.06	-	10.38	-	5.28	-	3.33	-	5.59
E	-	9.62	-	10.61	-	8.02	-	2.80	-	-	-	6.21
IV	-	0.96	-	13.13	-	2.36	-	5.28	-	-	-	4.35
DA	-	0.96	-	19.19	-	4.25	-	4.04	-	13.33	-	8.35
NA	11.11	0.96	14.47	1.01	25.41	-	28.35	-	24.24	-	20.72	0.39
IA	-	-	-	5.56	-	0.94	-	1.24	-	5.00	-	2.55
SA	5.05	-	-	4.54	1.10	3.77	2.36	2.17	9.09	-	3.52	2.10
PA	3.03	49.04	1.32	22.73	20.44	33.96	35.43	33.23	-	35.00	12.04	34.79

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

TABLE C.5

PERCENTAGE OF COMMUNICATIVE BEHAVIORS AT THE FIFTH OBSERVATION - FIVE DYADS

	Y Dyad		H Dyad		N Dyad		Mc Dyad		L Dyad	Totals	
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby Mother	Baby	Mother
M	5.80	18.18	4.32	17.14	-	24.07	4.44	26.61		3.64	21.50
T	81.16	10.61	43.88	9.39	37.13	9.26	52.22	19.88		53.59	12.29
ET	-	1.52	-	6.53	-	7.41	-	5.81		-	5.32
E	-	9.09	-	8.98	19.83	28.52	-	6.73	Attempted	4.96	13.33
IV	-	-	-	8.16	-	2.96	-	4.89	Twice	-	4.00
DA	-	-	-	16.73	-	2.22	-	10.09	But Was	-	7.26
NA	2.90	-	36.69	0.82	12.24	-	15.56	0.31	Unsuccessful	16.85	0.28
IA	-	-	-	6.12	-	0.74	-	1.83		-	2.17
SA	7.24	-	-	7.76	-	1.85	15.56	1.83		5.70	2.86
PA	2.90	60.61	15.11	18.37	30.80	22.96	12.22	22.02		15.26	30.99

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.

TABLE C.6

PERCENTAGE OF COMMUNICATIVE BEHAVIORS AT THE SIXTH OBSERVATION - FIVE DYADS

	Y Dyad		H Dyad		N Dyad		Mc Dyad		L Dyad		Totals	
	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother	Baby	Mother
M	1.56	30.99	10.00	20.00	1.60	21.43	8.45	23.90	13.79	32.69	7.08	25.80
T	59.38	12.68	5.00	36.00	67.73	13.53	40.85	18.01	75.86	3.85	49.76	16.81
ET	-	2.82	-	-	-	12.03	-	4.78	-	1.92	-	4.31
E	-	4.23	-	-	0.96	13.91	-	5.88	-	7.69	0.19	6.34
IV	-	2.82	-	4.00	-	0.75	-	1.47	-	5.77	-	2.96
DA	-	8.45	-	12.00	-	1.13	-	7.35	-	15.38	-	8.86
NA	32.81	-	60.00	-	17.57	0.38	12.68	-	10.35	-	26.68	0.08
IA	-	1.41	-	4.00	-	4.13	-	3.31	-	1.92	-	2.96
SA	6.25	1.41	-	16.00	0.64	1.88	8.45	0.74	-	-	3.07	4.01
PA	-	35.21	25.00	8.00	11.50	30.83	29.58	34.56	-	30.77	13.22	27.87

Key: M = Mand; T = Tact; ET = Extended Tact; E = Echoic; IV = Intraverbal; DA = Dominant Autoclitic; NA = Negative Autoclitic; IA = Informative Autoclitic; SA = Submissive Autoclitic; PA = Positive Autoclitic.